GE Nuclear Energy

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April 16, 1996

MFN 050-96
Docket No. 52-001

Mr. Dennis M. Crutchfield
Associate Director for Advanced Reactors
and License Renewal
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Crutchfield:

Transmitted herewith, in the form of markups to pages of the ABWR Design Control Document (DCD), are ten proposed changes to the ABWR design description which result from information developed in the course of the ABWR First-Of-A-Kind Engineering (FOAKE) program. Ten copies are enclosed for review by the NRC staff. The need for the proposed changes prior to completion of rulemaking has only recently been determined from an updated analysis of FOAKE detailed design information. The background for that analysis and this submittal is set forth below.

GE undertook the ABWR FOAKE activity pursuant to a June 1993 contract with the Advanced Reactor Corporation (ARC) to perform detailed design of the ABWR for its use in the United States. The basic approach of the GE FOAKE activity is to develop the design details of the ABWR consistent with the requirements of the design undergoing NRC certification, a key objective being the development and maintenance of a highly standardized design. This means that the certified design and the FOAKE design must be consistent, with the FOAKE design being much more detailed in its description.

The FOAKE design activity may identify changes which would result in a substantial benefit to safety, reliability or economy. Their consideration, however, is done under an approach which is closely controlled. Any proposed design change to the DCD is processed in accordance with rigorous internal GE review procedures; and proposed changes are only accepted for compelling reasons, in the spirit of maintaining the detailed ABWR design as close as practicable within the boundaries of the DCD. In December of 1995, two design changes were identified that were needed to bring the DCD into compliance with NRC regulations in effect at the time of FDA issuance. In order to take full advantage of the thoroughness of the FOAKE activity, it was then decided to re-evaluate all the FOAKE Engineering Change Authorizations (ECAs) for purposes of determining if any other proposed DCD changes should accompany the two that were initially identified. Enclosed is a summary description of the resulting proposed DCD changes and of the screening criteria used by GE to evaluate whether the FOAKE information requires, or otherwise merits, change to Tier 1 or Tier 2 of the DCD.

Hinted Dist D050 1/1 Encls TO: File Center NRR/DRPM/PDST NRC PDR

Five of the changes proposed herewith are to Tier 1 (and corresponding portions of Tier 2) of the DCD and five are to Tier 2 only. None of the proposed changes are necessary to assure adequate protection of the public health and safety. Rather, as described in the enclosure, two are proposed to bring Tier 1 or Tier 2 into compliance with regulations in effect at the time the ABWR FDA was issued, four are proposed to make the design described in the DCD functionally operable as intended, one is proposed to effect a change to technical specifications, and three would effect design improvements which require minor modifications and which GE believes should be incorporated in the DCD at this time.

We believe the six changes proposed to assure regulatory compliance and functional operability need to be made prior to completion of design certification. As respects the change to technical specifications and the three design improvement changes, we believe it desirable, though not essential, that these changes be made now; we are, however, prepared to defer them if their present consideration would delay timely completion of staff review of the six required changes.

The FOAKE program has identified a number of additional desirable design improvements; however, the implementing design changes need not be made at this time since they qualify for post-certification §50.59-type change treatment (i.e., they do not affect Tier 1 or Tier 2* or technical specifications, or result in an unreviewed safety question). Those changes will be made in accordance with governing procedures as established by the Commission.

We will, of course, cooperate fully with the staff in completing early review of and action on the proposed design changes submitted herewith.

Sincerely yours,

J. N. Fox FOR

Joseph F. Quirk

cc: (w/o attachments)

WT Russell	(NRC)
FJ Miraglia	(NRC)
TH Boyce	(NRC)
SM Franks	(DOE)

ABWR Design Change Assessment
Review of FOAKE Design Changes

Change No.	Description	Tier 1 Impact	Screen (Notes)	Remarks
1	Change the Reactor Building and Radwaste Building HVAC Systems to use electric heating in place of hot water heating, split the single intake configuration into three to provide redundancy, and use high efficiency filters in place of medium grade bag-type filters. Use of electric heating will avoid in-service freezing. The change will provide air intake redundancy to satisfy system maintenance needs.	Yes	4	This change addresses a reliability & maintainability issue, rather than a safety concern. The change results in a minor modification to Tier 1, although there is no functional Tier 1 impact.
2	Add an additional chiller/pump set to the HVAC Emergency Cooling Water System. is provides functional redundancy to avoid the loss of cooling for the Control and Reactor Building Safety-Related Electrical Equipment Area HVAC Systems, potentially challenging electrical equipment environmental qualification temperature limits. The added redundancy will also satisfy system maintenance needs.	No	4	The change does not impact Tier 1 because Tier 1 does not specify divisional equipment quantity and logic.
3	Change the smoke removal method for three HVAC systems (for Reactor Building Safety-Related Electrical Equipment, Control Room Habitability Area, and Control Building Safety-Related Equipment Area) to comply with the accepted method prescribed by the industrial standards (ASHRAE and NFPA) referenced in Tier 2. Further, replace centrifugal fans with vaneaxial type fans as necessary for space conservation. Finally, provide service to the FMCRD Panel Rooms from Divisions A and B of the Reactor Building Safety-Related Electrical Equipment HVAC System, instead of Divisions B and C.	Yes	3	The change ensures functionality and compliance with Tier 2 commitments.
4	Reassign the Main Control Room HVAC exhaust fans ("B" as "C," and "C" as "B") according to their respective divisional space. This change will avoid a potential divisional cross-over of cooling and power.	Yes	4	The change has no safety significance and no impact on the safety functions described in Tier 1. However, it does impact designations on Tier 1 and Tier 2 figures.

ABWR Design Change Assessment
Review of FOAKE Design Changes

5	This change package identifies various Tier 1 and Tier 2 inconsistencies, such as the radiation zone classification of a room shown in figure, "Reactor Building Radiation Zone Maps, Elevation 12300 mm."	Yes	3	Tier 1 and Tier 2 figures and text are modified.
6	Provide power for each pair of motor operated isolation dampers in series (total four pairs in a division) for the Control Room Habitability Area HVAC System from two independent Class 1E divisions, instead of powering both dampers from a single division. Also, reflecting the Tier 2 arrangement, a cross-tie is added between the two inlet ducts of the Emergency Filtration Unit on the Tier 1 figure. All of this assures necessary alignment of dampers and prevention of infiltration of unfiltered air in case of emergency and loss of one division of power.	Yes	1	The change is necessary to ensure compliance with single failure criteria.
7	Delete the rupture disks originally intended to protect the low pressure exhaust side of the RCIC turbine case and exhaust line from overpressurization. Existence of the rupture disks is not consistent with interfacing system LOCA (ISLOCA) requirements. Removal of the rupture disks and upgrading of the associated piping and valves corrects a SSAR inconsistency regarding ISLOCA.	No	3	The change is necessary for conformance to Tier 2 commitments on ISLOCA.
8	Upgrade the FMCRD and scram piping design pressures based on tests and evaluations of water hammer effects. The changes are consistent with the ASME Code which requires use of equipment events rather than plant events in determining the design pressure.	No	1	A change in design pressure is needed due to new design information. The change ensures compliance with ASME Code per 10CFR50.55a.
9	Use a higher strength material for the cladded shells of the lower drywell access tunnels and RPV pedestal. This change is identified based on considerations of cladability of the material and strength to withstand high thermal stresses predicted by detailed analyses performed subsequent to the SSAR review stage of the licensing process.	No	3	Based on detailed design evaluations, the materials specified in the DCD are not adequate.
10	Correction of inconsistencies in technical specifications (Chapter 16 and related Tier 2 sections).	No	2	Based on detailed design evaluation and review of technical specifications.

ABWR Design Change Assessment
Review of FOAKE Design Changes

Notes:

Screening Criteria: GE will not propose to change its DCD during the period from FDA issuance to Design Certification unless:

1.) The change corrects an error or deficiency necessary to assure adequate protection of the public health and safety, or to bring the DCD (Tier 1 or Tier 2) into compliance with regulations in effect at the time the ABWR FDA was issued;

2.) The change affects a technical specification;

3.) The change is necessary to make the DCD design functionally operable (as intended); or

4.) The change is a design improvement which GE determines should be incorporated into the design at this time.

All changes which satisfy Criteria 1, 2 or 3 shall be incorporated into the DCD prior to Design Certification. Any Tier 1 or Tier 2 changes which satisfy Criterion 4 should be addressed on a case-by-case basis.

PROPOSED CHANGES

CHANGE PACKAGE NO. 1

Eliminate Hot Water Heating for RB and RWB HVAC

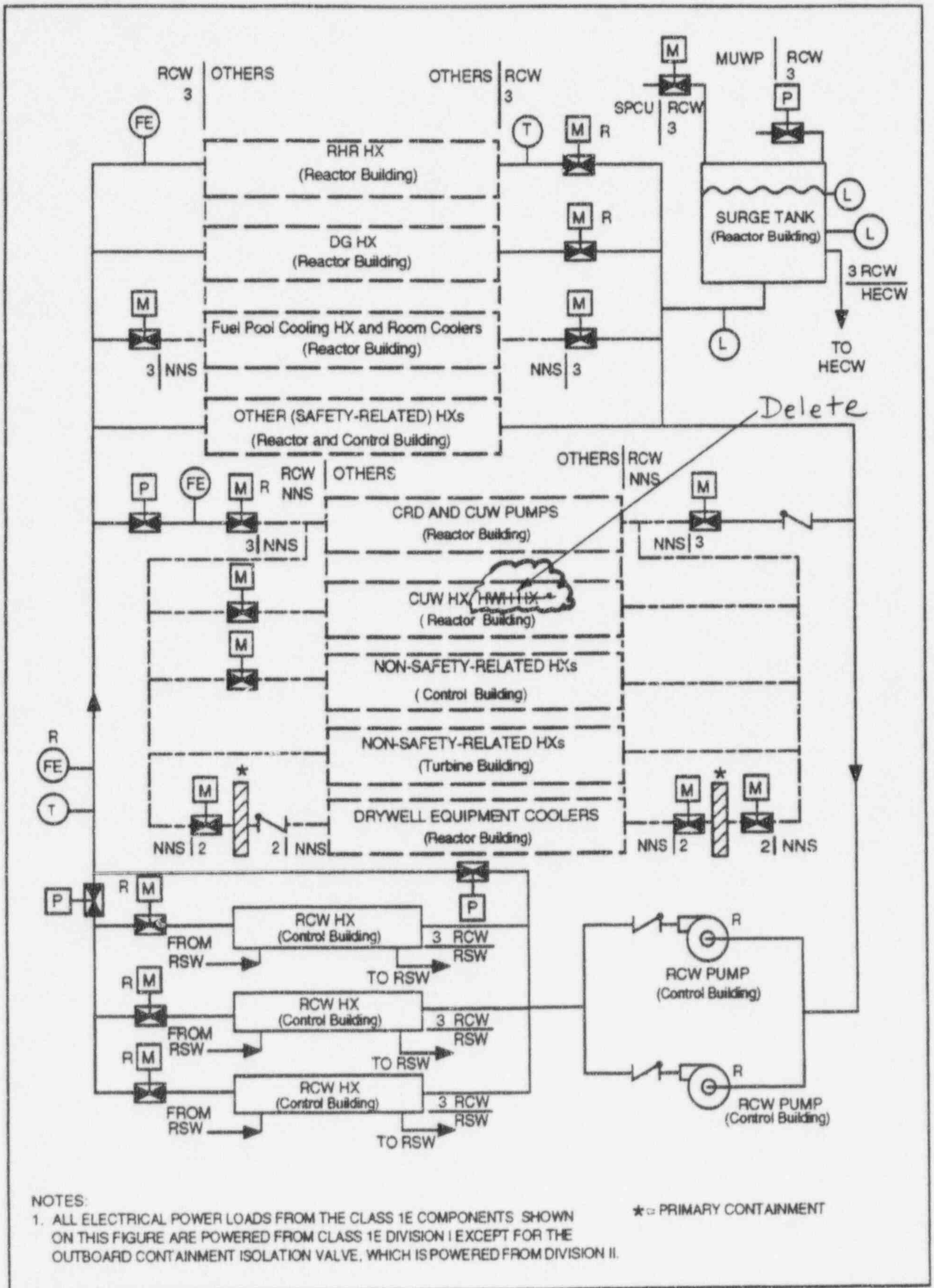

Figure 2.11.3a Reactor Building Cooling Water System (RCW-A)

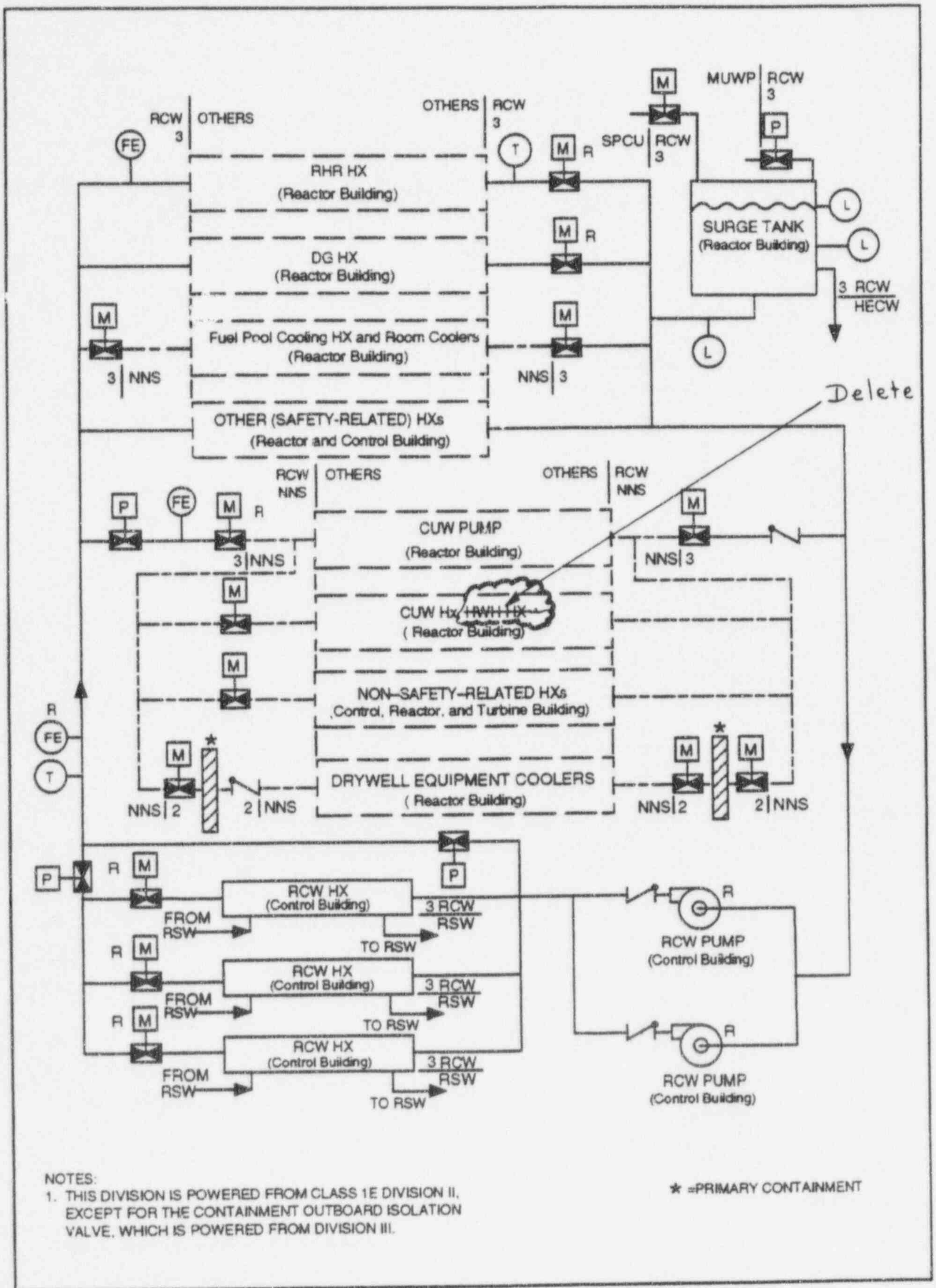

Figure 2.11.3b Reactor Building Cooling Water System (RCW-B)

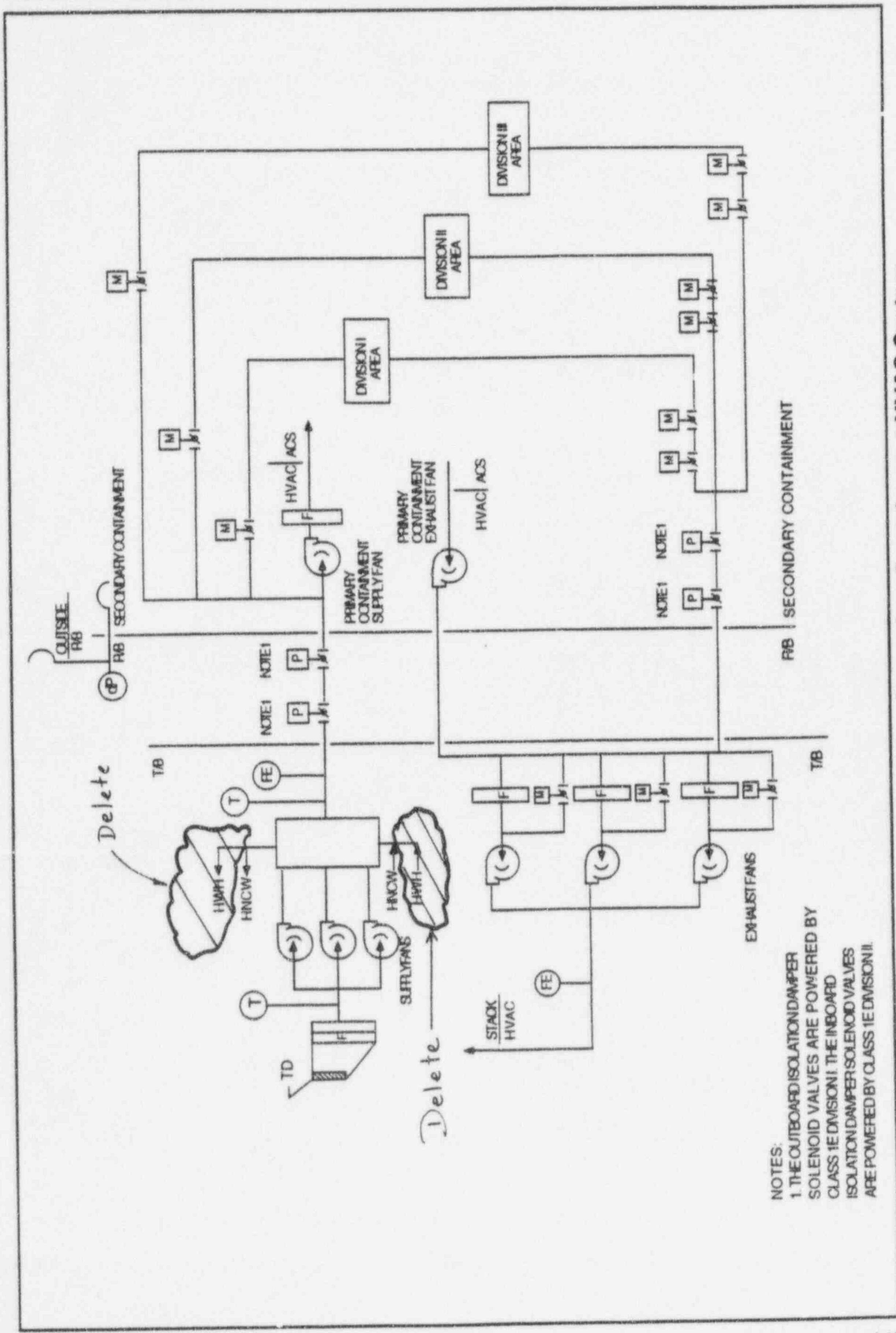

Figure 2.15.5j Reactor Building Secondary Containment HVAC System

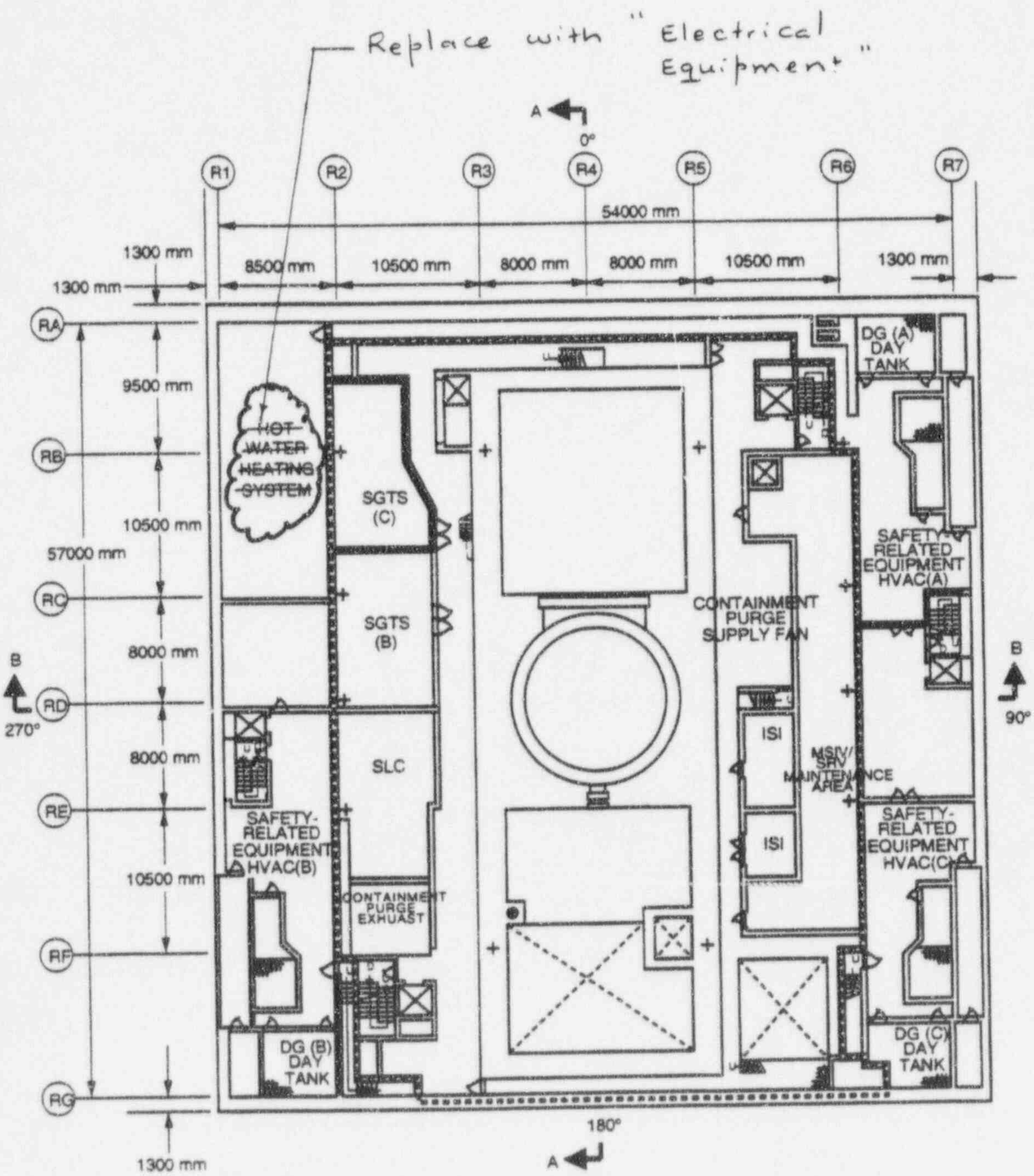

Figure 2.15.10l Reactor Building Arrangement, Floor 3F—Elevation 23500 mm

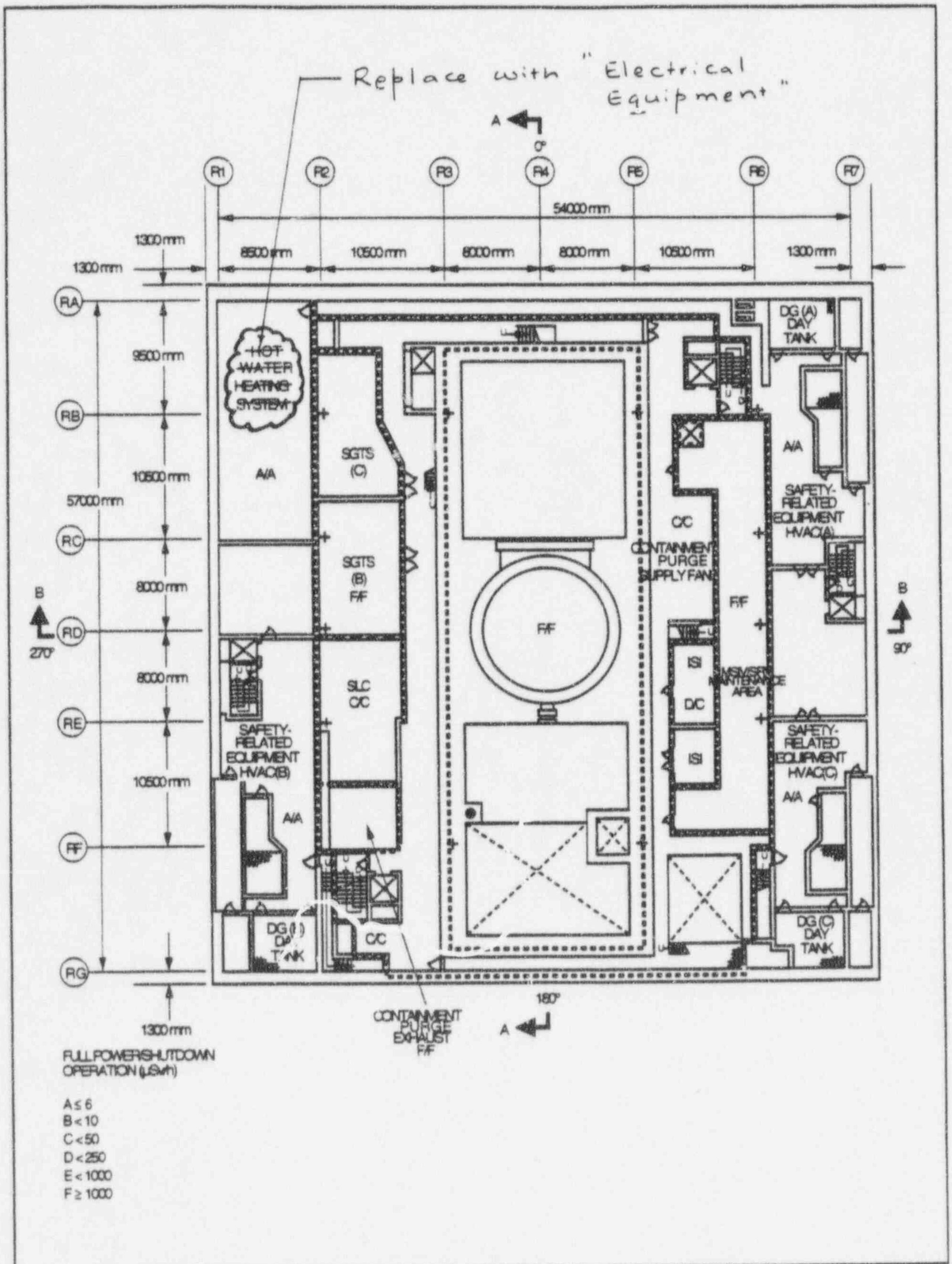

Figure 3.2k Reactor Building Radiation Zone Map for Full Power and Shutdown Operations, Floor 3F—Elevation 23500 mm

1.2.2.12.10 Turbine Service Water System

The Turbine Service Water System is summarized ion Subsection 9.2.16.1.3 and 9.2.16.2.3.

1.2.2.12.11 Station Service Air System

The Station Service Air System provides a continuous supply of compressed air of suitable quality and pressure for general plant use. The service air compressor discharges into the air receivers and the air is then distributed throughout the plant.

1.2.2.12.12 Instrument Air System

The Instrument Air System is summarized in Subsection 9.3.6.2.

1.2.2.12.13 High Pressure Nitrogen Gas Supply System

Nitrogen gas is normally supplied by the Atmospheric Control System to meet the requirement of (1) the Main Steam System SRV automatic depressurization and relief function accumulators, (2) the main steam isolation valves, and (3) instruments and pneumatic valves using nitrogen in the Reactor Building. When this supply of pressurized nitrogen is not available, the High Pressure Nitrogen Gas Supply (HPIN) System automatically maintains nitrogen pressure to this equipment. The HPIN System consists of high pressure nitrogen storage bottles with piping, valves, instruments, controls and control panel.

1.2.2.12.14 Heating Steam and Condensate Water Return System

The Heating Steam and Condensate Water Return System supplies heating steam from the House Boiler for general plant use and recovers the condensate return to the boiler feedwater tanks. The system consists of piping, valves, condensate recovery set and associated controls and instrumentation.

1.2.2.12.15 House Boiler System

The House Boiler System consists of the house boilers, reboilers, feedwater components, boiler water treatment and control devices. The House Boiler System supplies turbine gland steam and heating steam, including the concentrating tanks and devices of the high conductivity waste equipment.

1.2.2.12.16 Hot Water Heating System

Delete

The Hot Water Heating System is a closed-loop hot water supply to the various heating coils of the HVAC systems. The system includes two heat exchangers, ~~a backup heat exchanger,~~ surge and chemical addition tanks and associated equipment, controls and instrumentation.

Delete

Table 9.2-4a Reactor Building Cooling Water Division A

Operating Mode/Components	Normal Operating Conditions		Shutdown at 4 Hours		Shutdown at 20 Hours		Hot Standby (No Loss of AC)		Hot Standby (Loss of AC)		Emergency (LOCA) (Suppression Pool at 97°C	
	Heat*	Flow*	Heat	Flow	Heat	Flow	Heat	Flow	Heat	Flow	Heat	Flow
Essential												
Emergency Diesel Generator A	—	—	—	—	—	—	—	—	13.40	229	13.40	229
RHR Heat Exchanger A	—	—	108.02	1,199	34.75	1,199	—	—	25.54	1,199	89.18	1,199
Others (essential)†	3.18	205	3.60	205	3.81	205	3.39	205	4.10	205	4.19	205
Non-Essential												
CUW Heat Exchanger‡	20.10	159	—	159	—	159	20.10	159	20.93	159	—	—
FPC Heat Exchanger A*f*	7.12	279	7.12	279	7.12	279	7.12	279	7.12	279	9.63	279
Inside Drywell**	5.86	320	5.86	320	5.86	320	5.86	320	3.39	320	—	—
Others (non-essential)††	2.64	160	2.64	160	2.64	160	2.64	160	0.84	59	0.75	59
Total Load	38.94	1,123	127.24	2,322	54.01	2,322	38.94	1,123	75.36	2,450	117.23	1,971

* Heat in GJ/h; flow in m^3/h, sums may not be equal due to rounding.

† HECW refrigerator, CAMS coolers, room coolers (RHR, RCIC, CAMS), RHR motor and seal coolers.

‡ The heat transferred from the CUW heat exchanger at the start of cooldown is appreciable, but during the critical last part of a cooldown, the heat removed is very little because the temperature difference between the reactor water and the RCW System is small. Sometimes, the operators may remove the CUW heat exchangers from service during cooldown. Thus, the heat removed varies from about that during normal operation at the start of cooldown to very little at the end of cooldown.

f Includes FPC room cooler.

** Drywell (A & C) and RIP coolers.

†† Instruments and service air coolers; CUW pump cooler, CRD pump oil, and RIP MG sets. ~~A hot water exchanger is in this division which removes heat from the RCW System.~~

Delete

Delete

Table 9.2-4b Reactor Building Cooling Water Division B

Operating Mode/Components	Normal Operating Conditions		Shutdown at 4 Hours		Shutdown at 20 Hours		Hot Standby (No Loss of AC)		Hot Standby (Loss of AC)		Emergency (LOCA) (Suppression Pool at 97°C	
	Heat*	Flow*	Heat	Flow	Heat	Flow	Heat	Flow	Heat	Flow	Heat	Flow
Essential												
Emergency Diesel Generator B	—	—	—	—	—	—	—	—	13.40	229	13.40	229
RHR Heat Exchanger B	—	—	108.02	1,199	34.75	1,199	—	—	25.54	1,199	89.18	1,199
Others (essential)†	6.28	360	6.70	360	6.70	360	6.28	360	7.12	360	7.95	360
Non-Essential												
CUW Heat Exchanger‡	20.10	159	—	159	—	159	20.10	159	20.93	159	—	—
FPC Heat Exchanger B*f*	7.12	279	7.12	279	7.12	279	7.12	279	7.12	279	9.63	279
Inside Drywell**	5.44	279	6.28	279	5.40	279	5.40	279	2.51	279	—	—
Others (non-essential)††	2.93	159	1.47	159	1.47	159	1.47	159	0.33	9.1	—	9.1
Total Load	41.87	1,236	129.79	2,435	55.27	2,435	40.19	1,236	77.04	2,514	120.16	2,076

* Heat in GJ/h; flow in m^3/h, sums may not be equal due to rounding.

† HECW refrigerator, room coolers (RHR, HPCF, SGTS, FCS, CAMS), CAMS cooler, HPCF and RHR motor and mechanical seal coolers.

‡ The heat transferred from the CUW heat exchanger at the start of cooldown is appreciable, but during the critical last part of a cooldown, the heat removed is very little because the temperature difference between the reactor water and the RCW System is small. Sometimes, the operators may remove the CUW heat exchangers from service during cooldown. Thus, the heat removed varies from about that during normal operation at the start of cooldown to very little at the end of cooldown.

f Includes FPC room cooler.

** Drywell (B) and RIP coolers.

†† Reactor Building sampling coolers; LCW sump coolers (in drywell and reactor building), RIP MG sets and CUW pump coolers. ~~A hot water heating system heat exchanger is in this division which removes heat from the RCW System.~~

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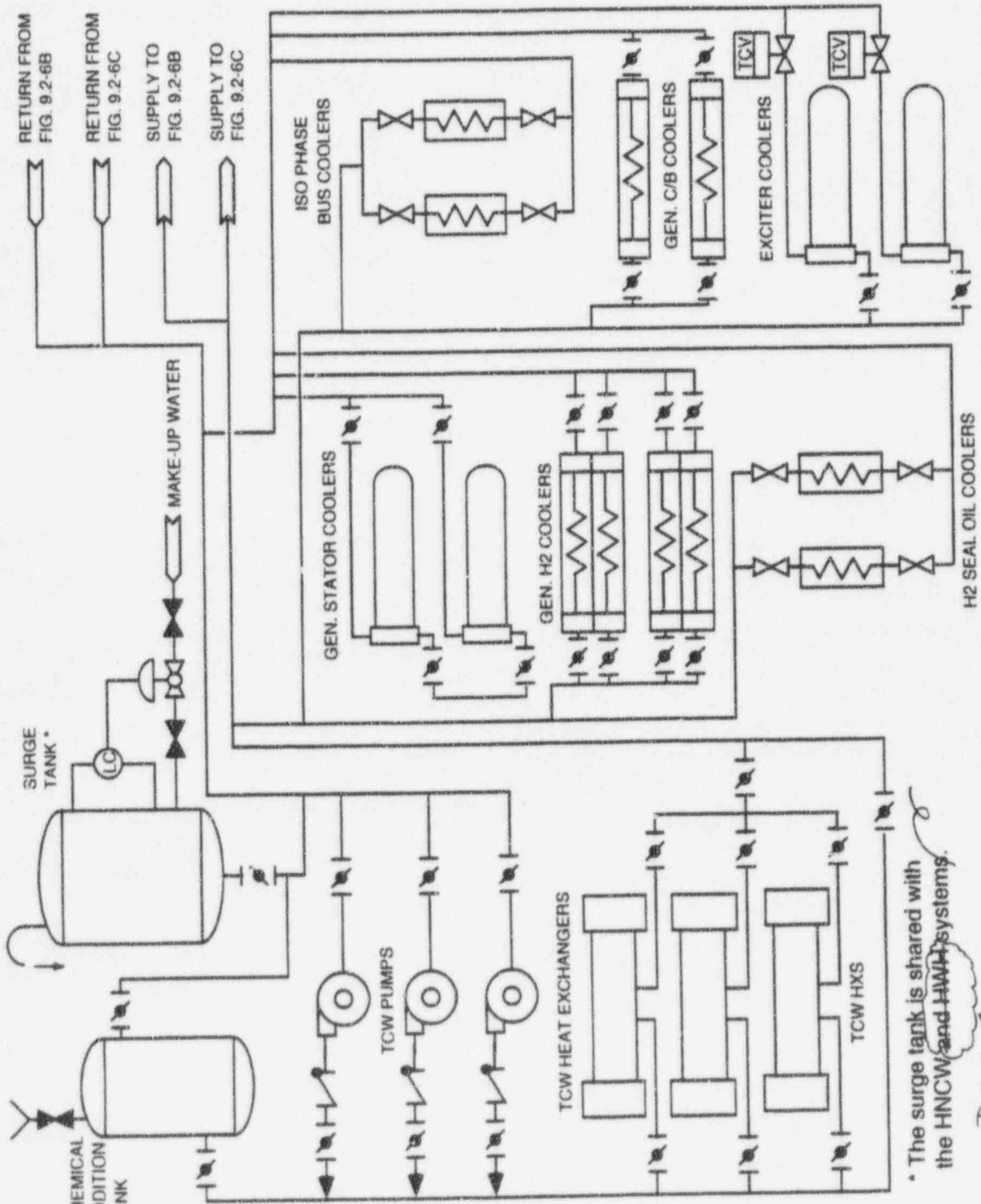


* The surge tank is shared with the HNCW and HWH systems. Delete

Figure 9.2-6a Turbine Building Cooling Water System Diagram

Design inside air temperatures for the secondary containment during normal operation is 40°C maximum in the summer and 10°C minimum in the winter.

9.4.5.1.2 System Description

The Reactor Building secondary containment HVAC System P&ID is shown in Figure 9.4-3. The system flow rates are given in Table 9.4-3, and the system component thermal capacities are given in Table 9.4-4. The HVAC System is a once-through type. Outdoor air is filtered, tempered and delivered to the secondary containment. The supply air system consists of ~~a medium grade bag~~ filter, a heating coil, a cooling coil, and three 50% supply fans located in the Turbine Building. Two are normally operating and the other is on standby. The supply fan delivers conditioned air through ductwork and registers to the secondary containment equipment rooms and passages. The exhaust air system consists of 3 filters and 3-50% capacity fans to be located in the Turbine Building. The exhaust fans pull air from the secondary containment rooms through ductwork, and filters. Monitors measure radioactivity before it is exhausted from the plant stack. HVAC air supply and exhaust used by the ACS for primary containment deinerting is discussed in Subsection 6.2.5.2.1(14) and the shutdown mode of operation in Subsection 6.2.5.2(3). Electric unit heaters are located in the large component entrance building. Supply air is directed into the space when the interior doors are open.

9.4.5.1.3 Safety Evaluation

Operation of the Secondary Containment HVAC System is not a prerequisite to assurance of either of the following:

(1) Integrity of the reactor coolant pressure boundary.

(2) Capability to safely shut down the reactor and to maintain a safe shutdown condition.

However, the system does incorporate features that provide reliability over the full range of normal plant operation. The following signals automatically isolate the Secondary Containment HVAC System:

(1) Secondary containment high radiation signal (LDS)

(2) Refueling floor high radiation signal (LDS)

(3) Drywell pressure high signal (LDS)

(4) Reactor water level low signal (LDS)

(5) Secondary containment HVAC supply/exhaust fans stop

flows for conformance to the design requirements. All major components are tested and inspected as separate components prior to installation to ensure design performance. The system is preoperationally tested in accordance with the requirements of Chapter 14.

9.4.6.5 Instrumentation Application

9.4.6.5.1 Radwaste Building Control Room

and an electric heating coil

The air-conditioning unit for the radwaste control room HVAC is started manually. A temperature indicating controller modulates the air-conditioning system via three-way hot water and chilled water valves to maintain space conditions. A differential pressure indicating controller modulates inlet vanes in the supply fan air inlets to maintain the positive static room pressure. Differential pressure indicators measure the pressure drop across the filter bank.

Delete

Delete

9.4.6.5.2 Radwaste Building Process Area HVAC

The air exhaust and supply fans for the Radwaste Building Process Area HVAC are started manually. The fan inlet dampers open when the fan is started. A flow switch installed in the exhaust fan discharge duct actuates an alarm on indication of fan failure in the main and radwaste control rooms and automatically starts the standby fan. The exhaust fan is interlocked with the supply fan to prevent the supply fan from operating if the exhaust fan is shut down.

Two pressure-indicating controllers modulate variable inlet vanes in the supply fan to maintain the area at a negative static pressure with respect to the atmosphere. The switch causes an alarm to be actuated if the negative pressure falls below the preset limit.

Differential pressure indicators measure the pressure drop across the filter section. The switch causes an alarm to be actuated if the pressure drop exceeds the preset limit.

Radiation monitors are installed in the radwaste process area exhaust duct to the main plant stack. A high radiation signal in the duct causes alarms to annunciate in the main control room and the radwaste control room.

If the radwaste process area exhaust radiation alarm continues to annunciate, the work area branch ducts are manually isolated selectively to locate the affected building area. Should this technique fail, because the airborne radiation has generally spread throughout the building, control room air conditioning continues operating. However, the air conditioning for the balance of the building is shut down. The operators, using approved plant health physics procedures, then enter the work areas to locate and isolate the leakage source.

Table 9.4-4f HVAC System Component Descriptions—Non-Safety-Related Heating Cooling Coils (Response to Question 430.243)

Heating/Cooling Coils	Quantity	Cooling (MJ/h)	Heating (MJ/h)
R/B Secondary Containment HVAC	~~(1 bank)~~ {Replace with "3 (1 on standby)"}	6435.95	9601.17
RIP ASD HVAC Division A	1	2110.15	
RIP ASD HVAC Division B	1	2110.15	

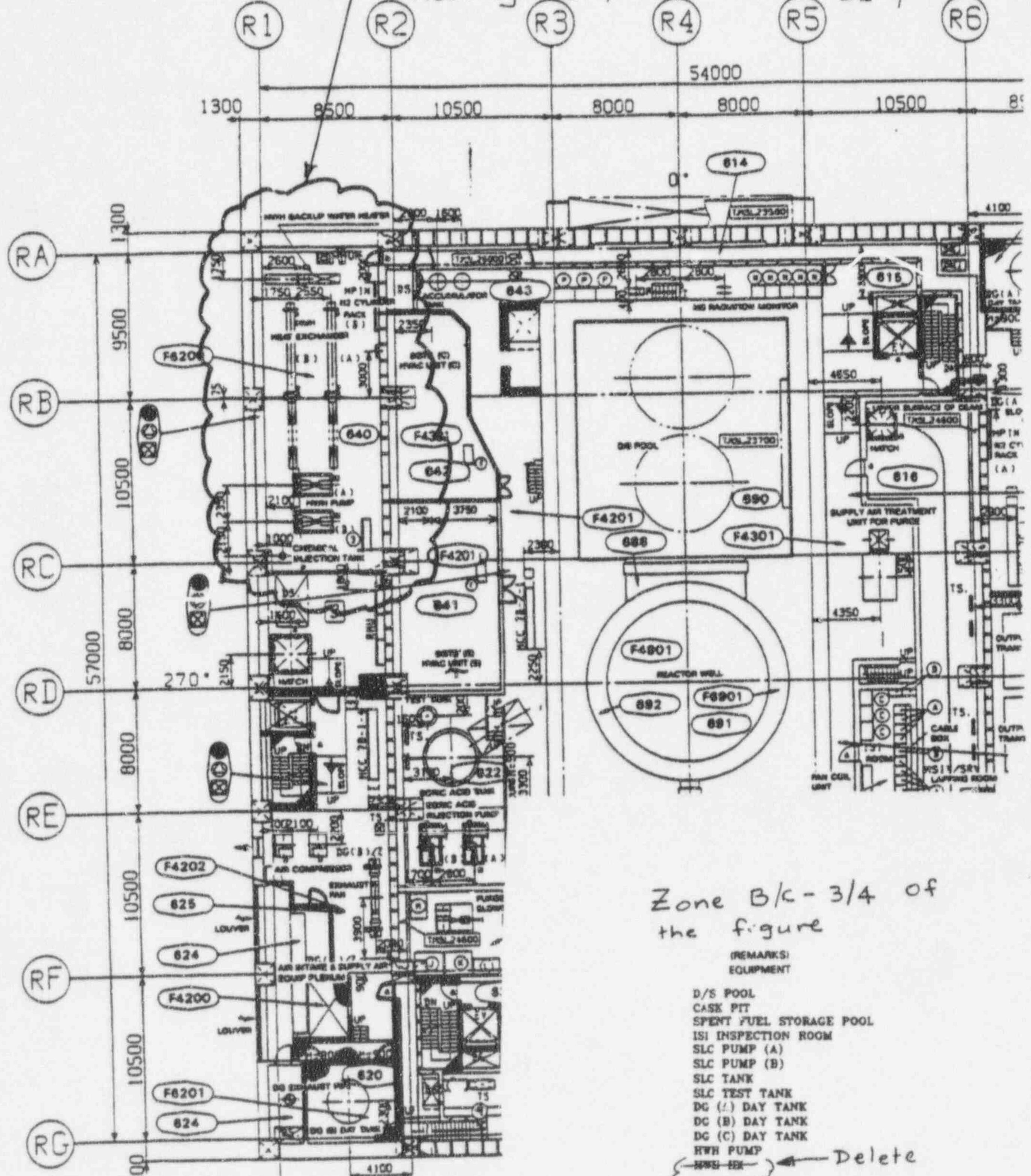
Table 9.4-4g HVAC System Component Descriptions—Non-Safety-Related Fans (Response to Question 430.243)

Fans	Quantity	Capacity (m^3/h)
R/B Secondary Containment Supply Fans	3 (1 on standby)	84,250
R/B Secondary Containment Exhaust Fans	3 (1 on standby)	86,250
R/B Primary Containment Supply Fan	1	22,000
R/B Primary Containment Exhaust Fan	1	22,000
RIP ASD Division A Supply Fans	2 (1 on standby)	50,000
RIP ASD Division B Supply Fans	2 (1 on standby)	50,000

Table 9.4-4h HVAC System Component Descriptions—Non-Safety-Related Filters (Response to Question 430.243)

Filters	Quantity	Capacity (m^3/h)
R/B Secondary Containment HVAC	~~(1 bank)~~ {Replace with "3(1 on standby)"}	~~172,500~~ {86250}
R/B Primary Containment Intake HEPA Filter	1	22,000
R/B Secondary Containment Exhaust Fans	3	57,500 (each)

In area bounded between RA and RB and R1 and R2, Replace Hot Water Heating equipment with Electrical Equipment.



Zone B/C - 3/4 of the figure

(REMARKS)
EQUIPMENT

D/S POOL
CASK PIT
SPENT FUEL STORAGE POOL
ISI INSPECTION ROOM
SLC PUMP (A)
SLC PUMP (B)
SLC TANK
SLC TEST TANK
DG (A) DAY TANK
DG (B) DAY TANK
DG (C) DAY TANK
HWH PUMP
~~HWH HX~~ ← Delete

Figure 1.2-10 REACTOR BUILDING, ARRANGEMENT PLAN AT ELEVATION 23500mm

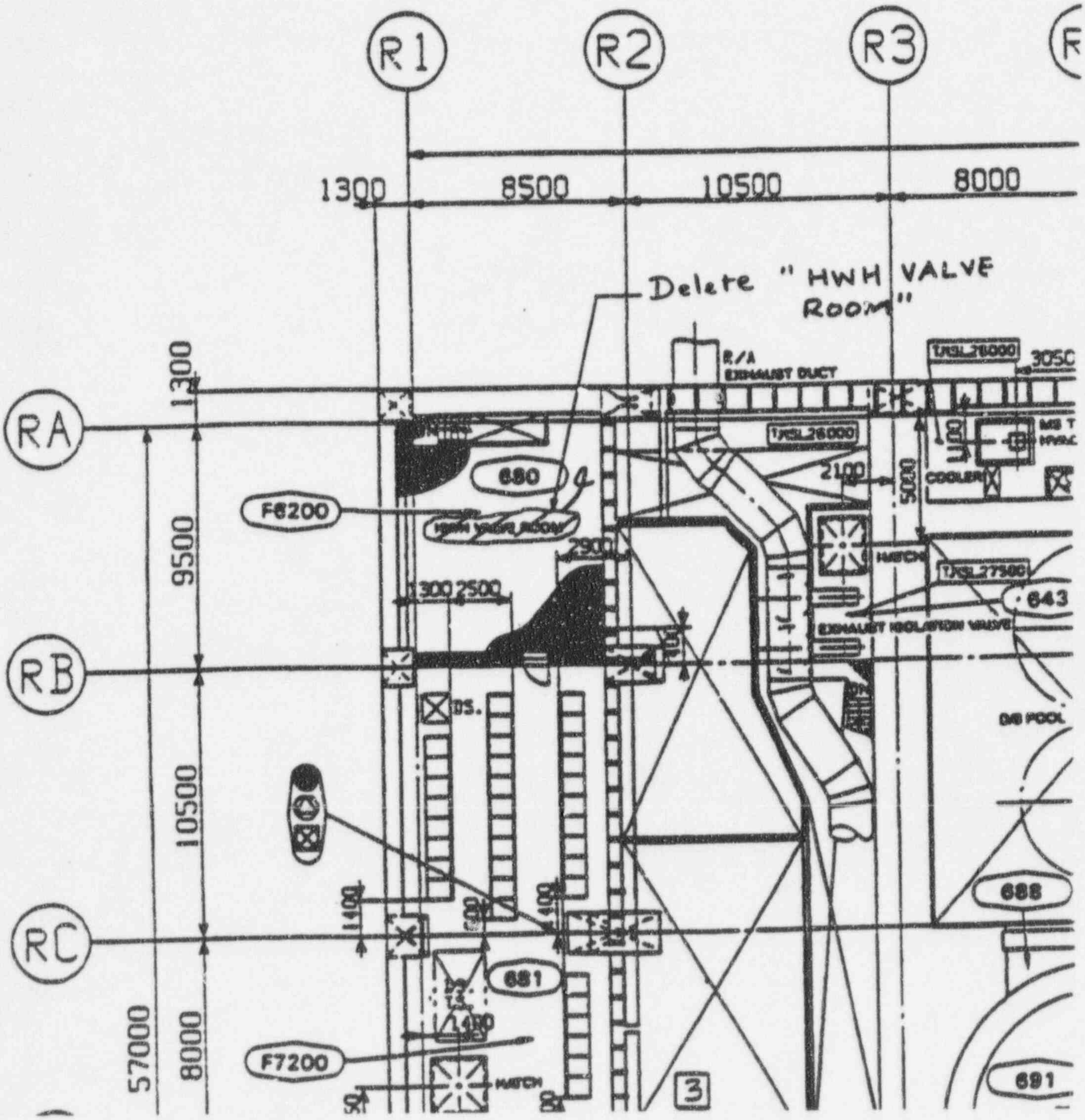
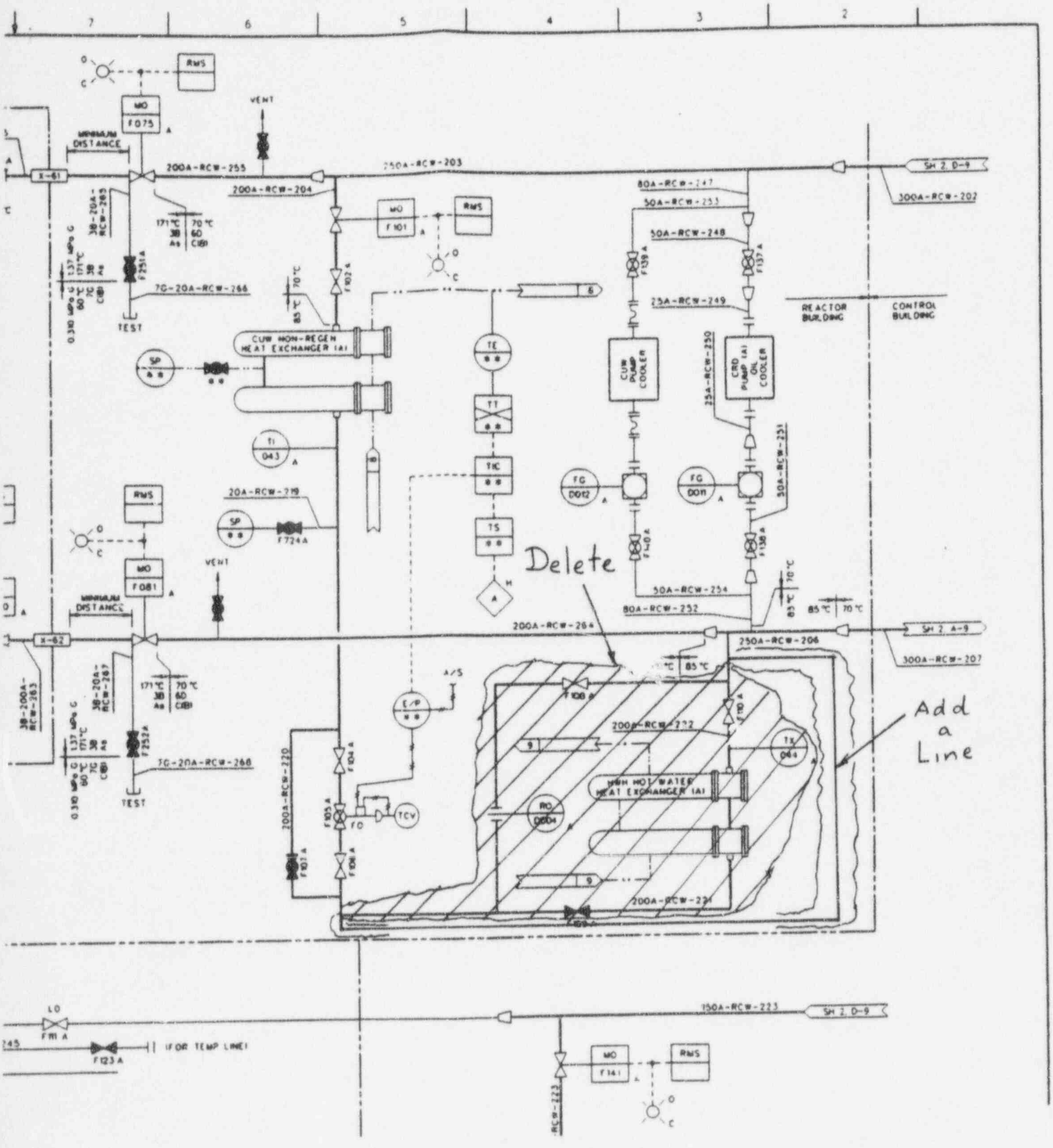


Figure 1.2-11 REACTOR BUILDING, ARRANGEMENT PLAN AT ELEVATION 27200mm



RCW (A)

FIGURE 9.2-1 REACTOR BUILDING COOLING WATER SYSTEM P&ID (Sheet 3 of 9)

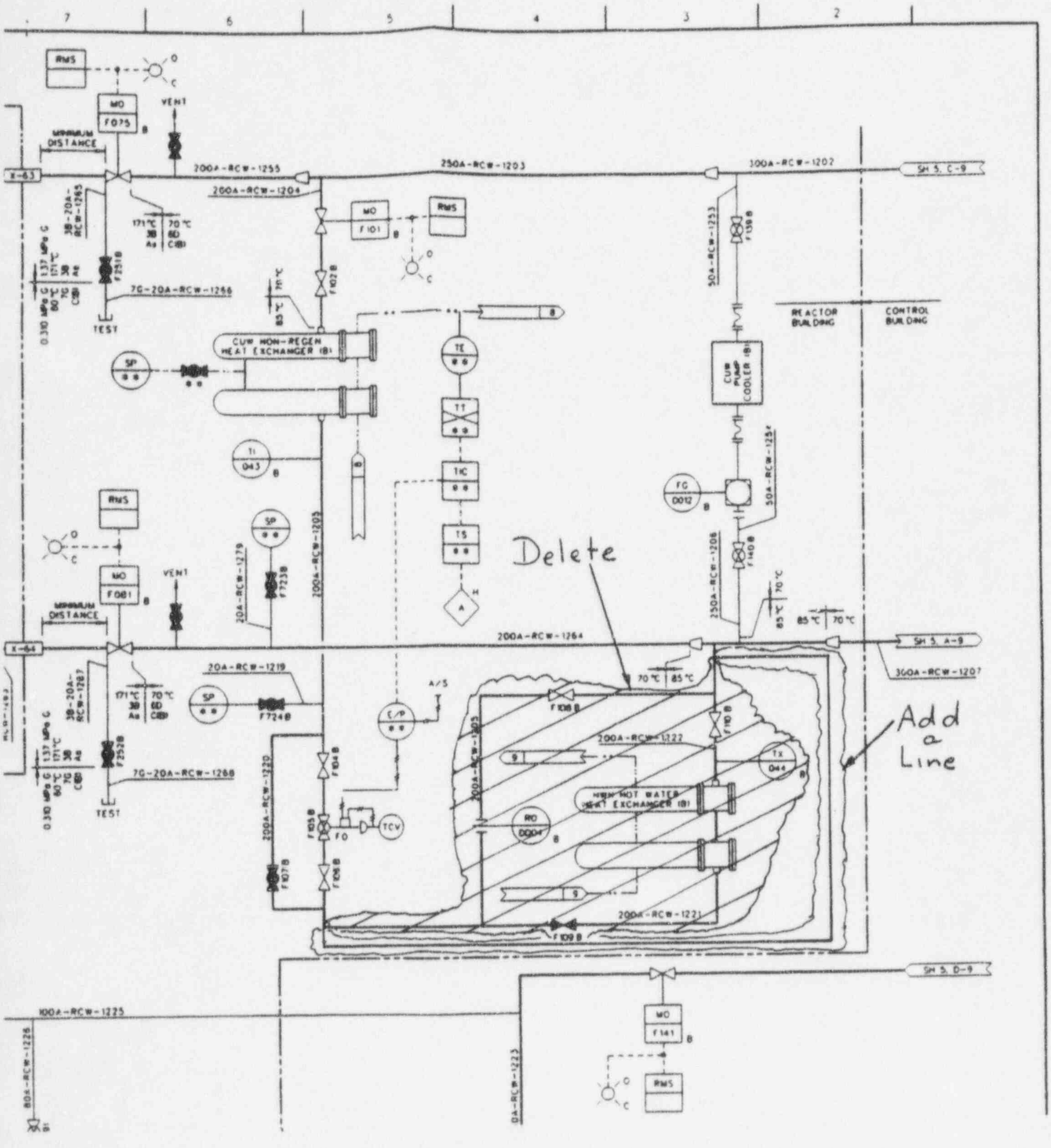


FIGURE 9.2-1 REACTOR BUILDING COOLING WATER SYSTEM P&ID (Sheet 6 of 9)

21-513

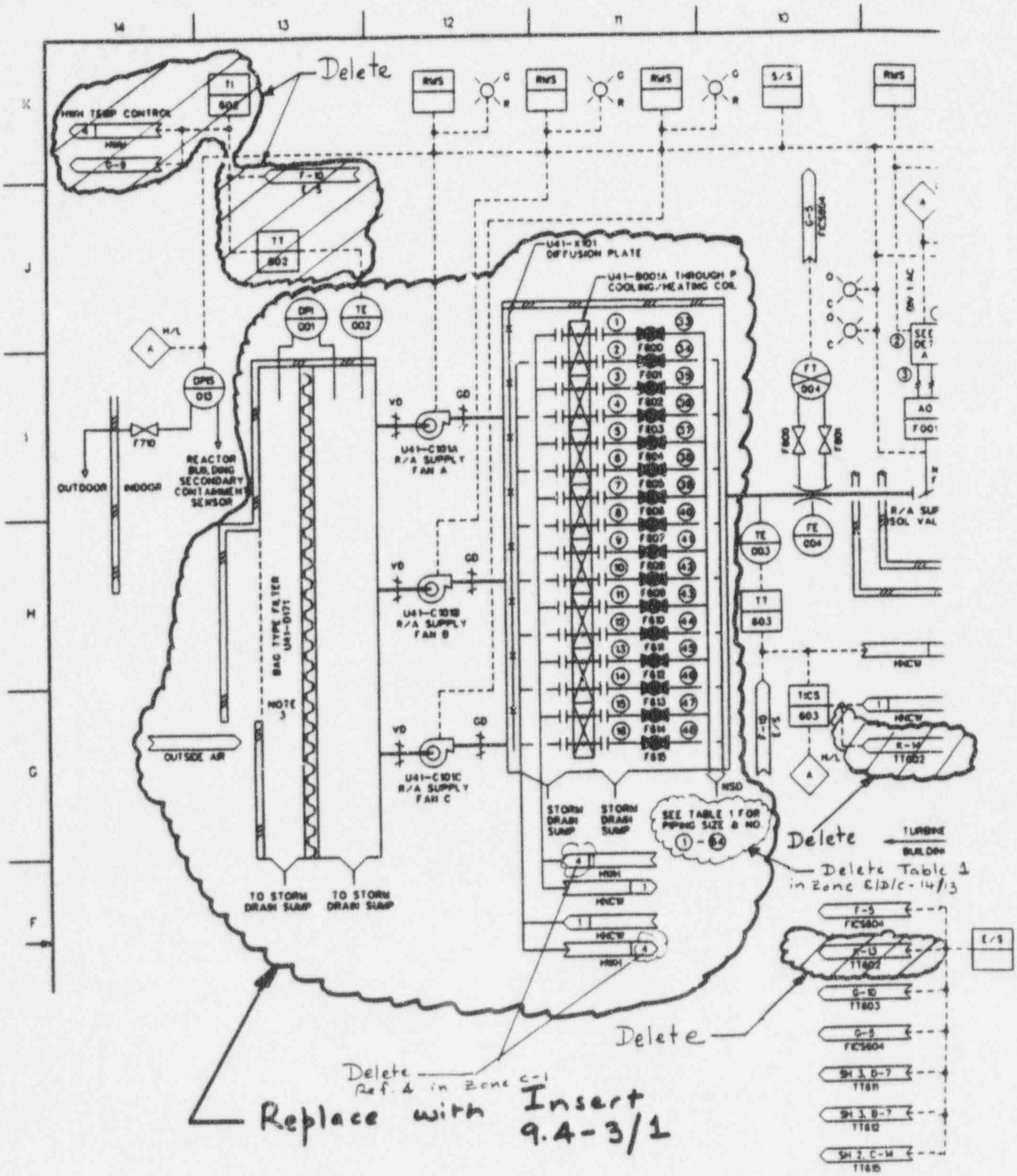
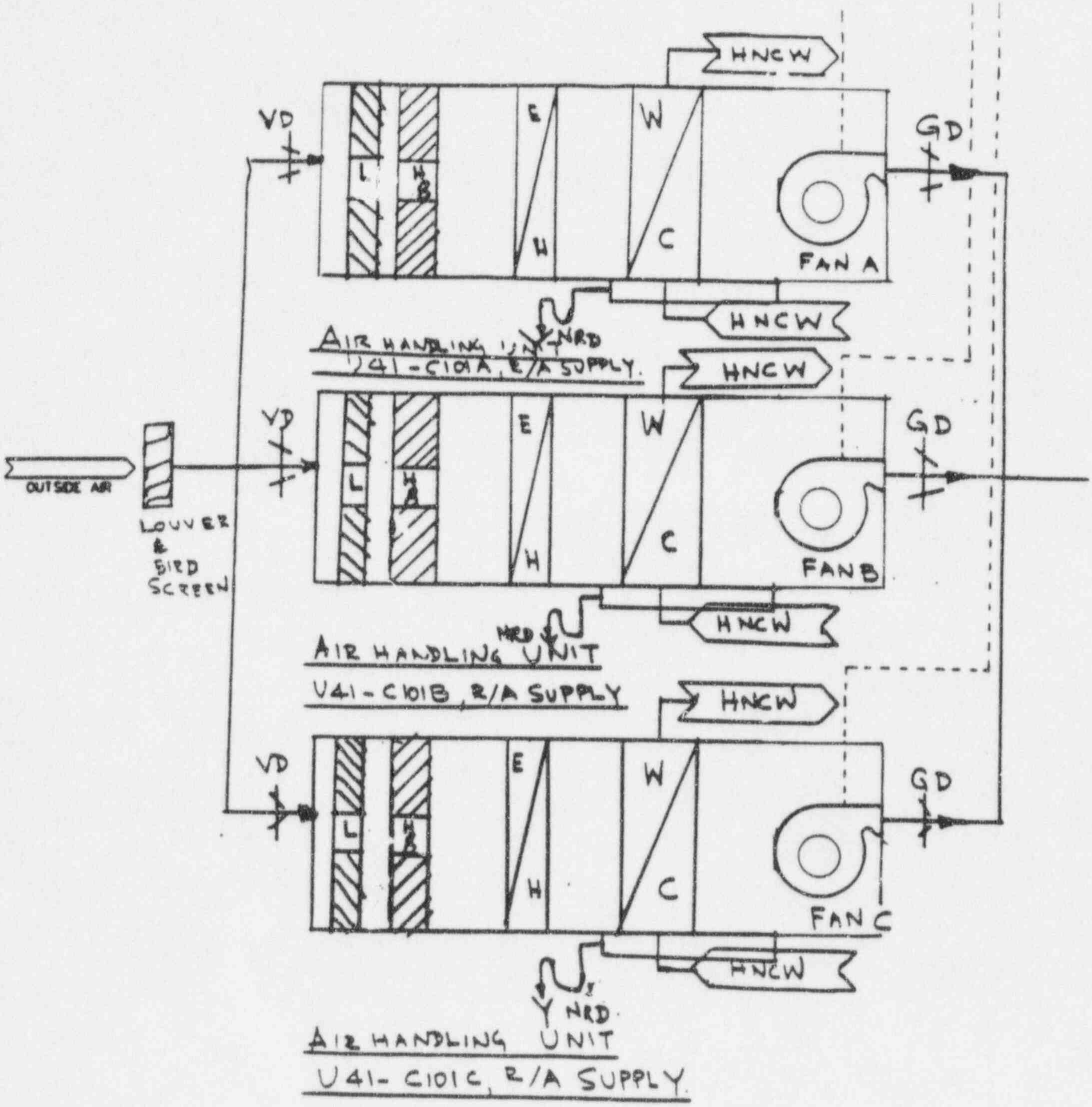


FIGURE 9.4-3 SECONDARY CONTAINMENT HVAC SYSTEM (Sheet 1 of 3)



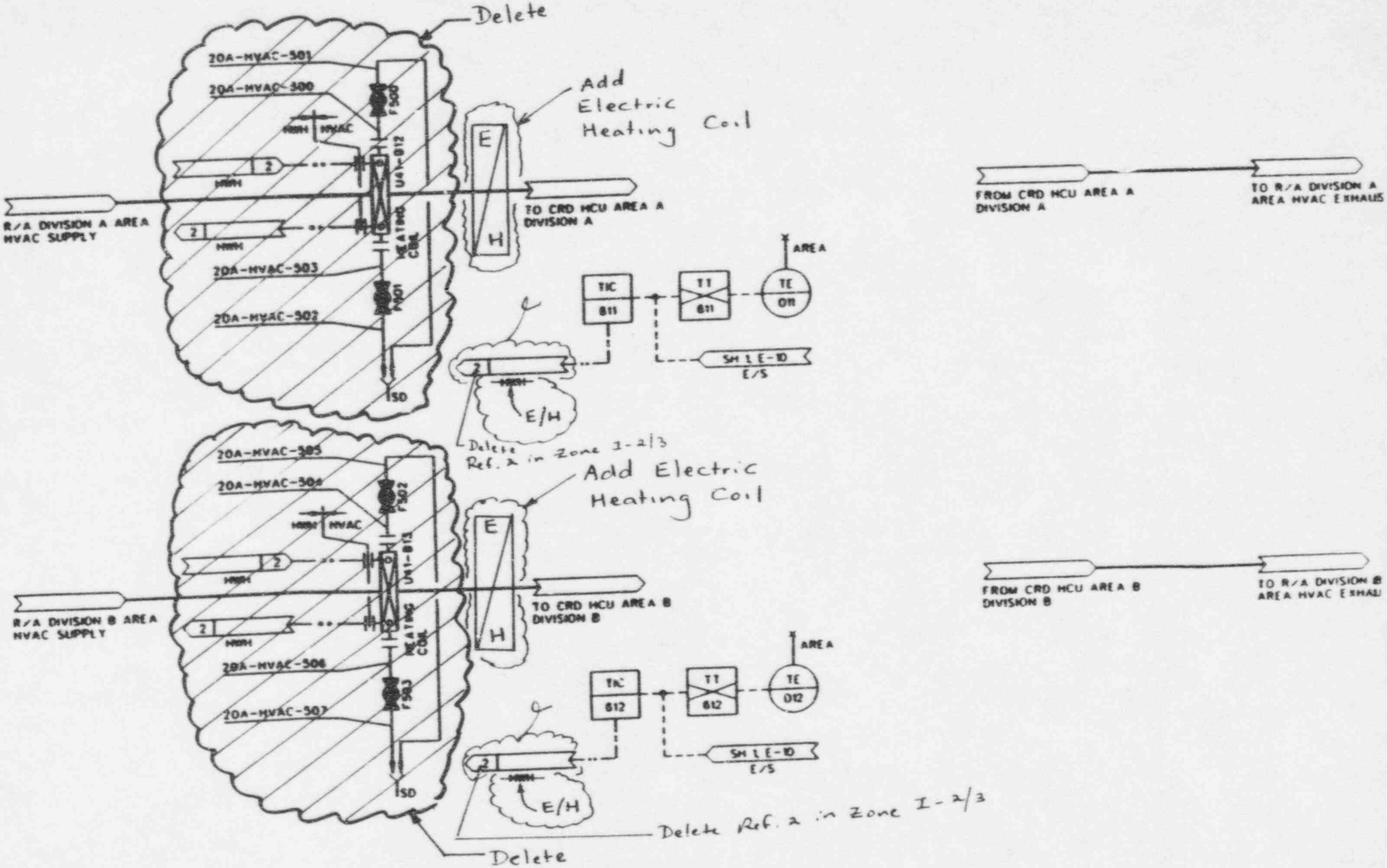
Legend:
L : Low Efficiency
HB : High Efficiency

Insert 9.4-3/1

For

FIGURE 9.4-3 SECONDARY CONTAINMENT HVAC SYSTEM (Sheet 1 of 3)

21-542.1



R/B HVAC

FIGURE 9.4-3 SECONDARY CONTAINMENT HVAC SYSTEM (Sheet 3 of 3)

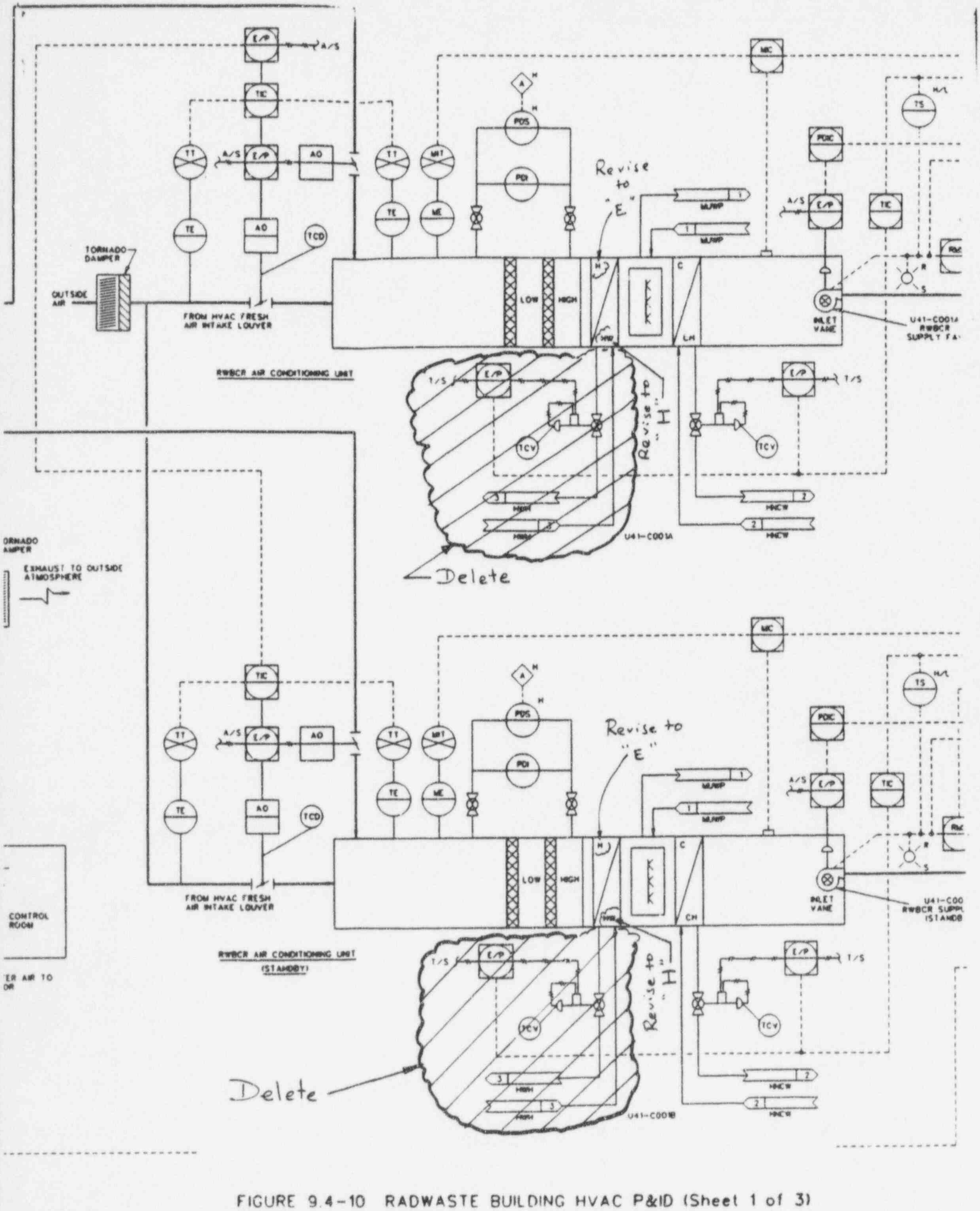
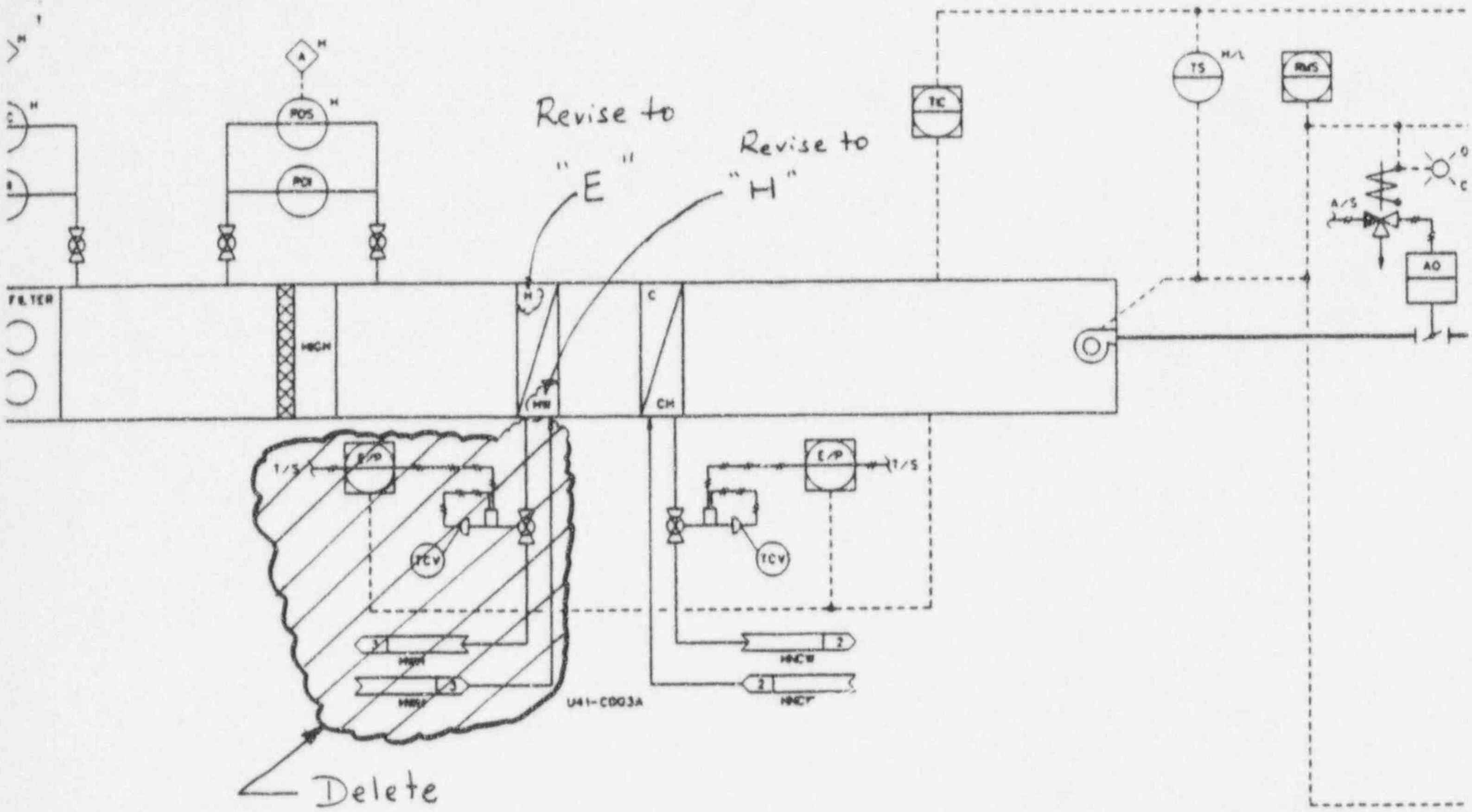


FIGURE 9.4-10 RADWASTE BUILDING HVAC P&ID (Sheet 1 of 3)



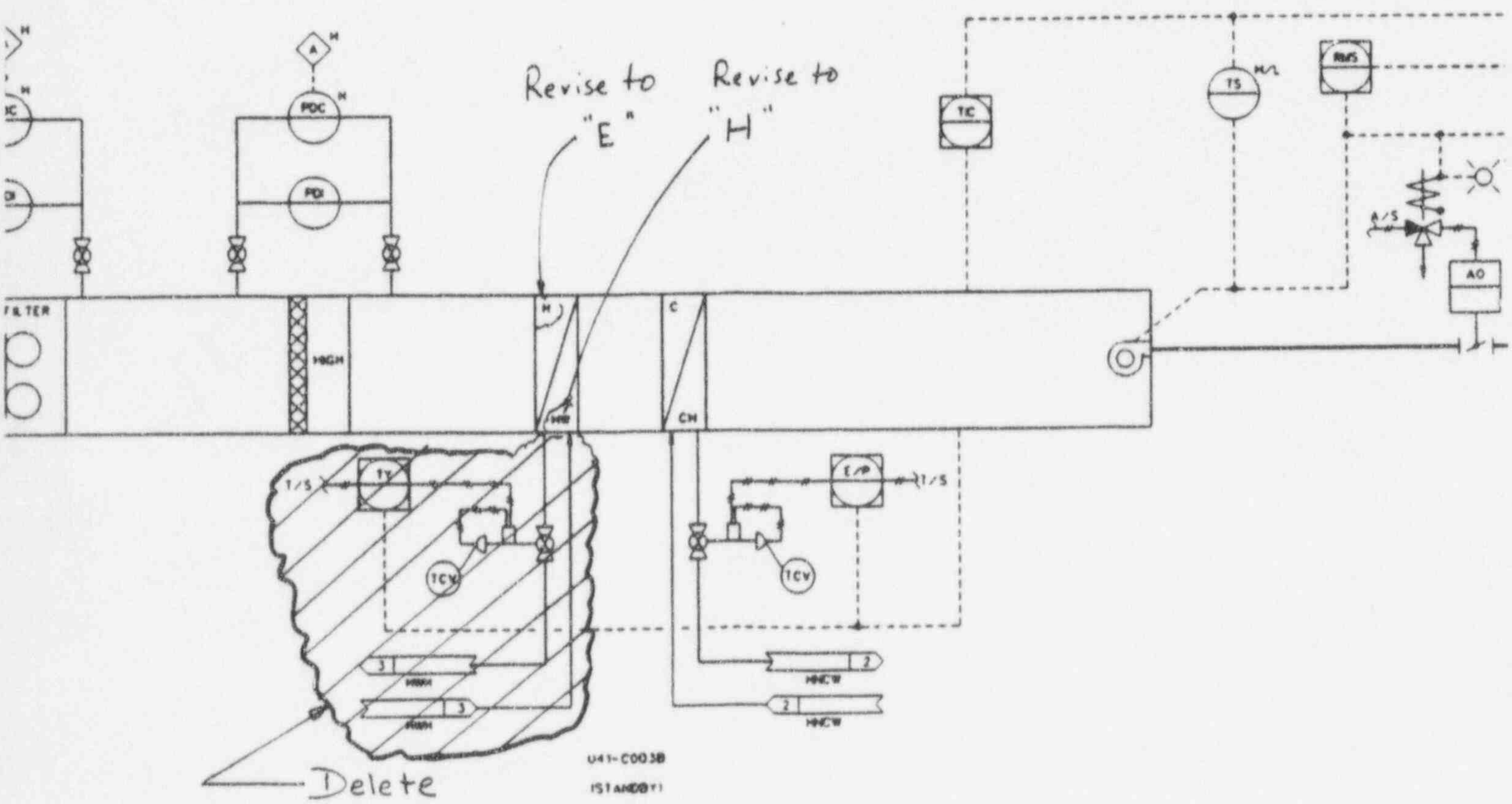


FIGURE 9.4-10 RADWASTE BUILDING HVAC P&ID (Sheet 2 of 3)

PROPOSED CHANGES

CHANGE PACKAGE NO. 2

Additional Chiller/Pump Set

Table 3.9-8 Inservice Testing Safety-Related Pumps and Valves (Continued)

No.	Qty	Description	Safety Class (a)	Code Cat. (c)	Valve Func (d)	Test Para (e)	Test Freq (f)	Tier 2 Fig.(g)
F025	5	Cooling water supply line to HECW refrigerator PCV	3	B	A	S	E2	9.2-1 sh. 2,5,8
F026	5	Cooling water supply line to HECW refrigerator maintenance valve	3	B	P		E1	9.2-1 sh. 2,5,8
F027	5	Cooling water line to HECW refrigerator bypass line	3	B	P		E1	9.2-1 sh. 2,5,8
F028	5	Cooling water return line from HECW refrigerator	3	B	P		E1	9.2-1 sh. 2,5,8
F029	2	Cooling water supply line to FPC Hx	3	B	P		E1	9.2-1 sh. 2,5
F030	2	Cooling water return line from FPC Hx	3	B	P		E1	9.2-1 sh. 2,5
F031	2	Cooling water supply line to FPC pump room air conditioner	3	B	P		E1	9.2-1 sh. 2,5
F032	2	Cooling water return line from FPC pump room air conditioner	3	B	P		E1	9.2-1 sh. 2,5
F033	2	Cooling water line to PCV Atmospheric Monitoring System clr	3	B	P		E1	9.2-1 sh. 2,5
F034	2	Return line from PCV Atmospheric Monitoring System clr	3	B	P		E1	9.2-1 sh. 2,5
F035	2	Cooling water supply line to SGTS room air conditioner	3	B	P		E1	9.2-1 sh. 2,5
F036	2	Cooling water return line from SGTS room air conditioner	3	B	P		E1	9.2-1 sh. 2,5
F037	2	Cooling water supply line to FCS room air conditioner	3	B	P		E1	9.2-1 sh. 2,5
F038	2	Cooling water return line from FCS room air conditioner	3	B	P		E1	9.2-1 sh. 2,5
F039	3	Cooling water supply line to RHR equipment room air conditioner	3	B	P		E1	9.2-1 sh. 2,5,8
F040	3	Cooling water return line from RHR equipment room air conditioner	3	B	P		E1	9.2-1 sh. 2,5,8
F041	3	Cooling water supply line to RHR pump motor	3	B	P		E1	9.2-1 sh. 2,5,8

Table 3.9-8 Inservice Testing Safety-Related Pumps and Valves (Continued)

No.	Qty	Description	Safety Class (a)	Code Cat. (c)	Valve Func (d)	Test Para (e)	Test Freq (f)	Tier 2 Fig.(g)
F719	3	Cooling water line to DG instrument line	3	B	P		E1	9.2-1 sh. 2,5,8
F720	3	Return water line from DG instrument line	3	B	P		E1	9.2-1 sh. 2,5,8
F721	3	Cooling water supply line to non-essential coolers FT instrument root valve	3	B	P		E1	9.2-1 sh. 2,5,8
F722	3	Cooling water supply line to non-essential coolers FT instrument root valve	3	B	P		E1	9.2-1 sh. 2,5,8
P24 HVAC Normal Cooling Water System Valves								
F053	1	HNCW supply line outboard isolation valve	2	A	I,A	L,P S	RO 3 mo	9.2-2
F054	1	HNCW supply line inboard isolation check valve (h1)	2	A, C	I,A	L,S	RO	9.2-2
F141	1	HNCW return inboard isolation valve (h1)	2	A	I,A	L,P,S	RO	9.2-2
F142	1	HNCW return outboard isolation valve	2	A	I,A	L,P S	RO 3 mo	9.2-2
P25 HVAC Emergency Cooling Water System Valves								
F001	5 6	Pump discharge line check valve	3	C	P	S	E2	9.2-3 sh. 1,2,3
F002	5 6	Pump discharge line maintenance valve	3	B	P		E1	9.2-3 sh. 1,2,3
F003	5 6	Refrigerator outlet line maintenance valve	3	B	P		E1	9.2-3 sh. 1,2,3
F004	2	Maintenance valve at HECW supply to MCR cooler TCV	3	B	P		E1	9.2-3 sh. 1,2,3
F005	2	HECW supply to MCR cooler Temperature Control Valve (TCV)	3	B	A	S	E2	9.2-3 sh. 1,2,3
F006	2	Maintenance valve at HECW supply to MCR cooler TCV	3	B	P		E1	9.2-3 sh. 1,2,3
F007	6	Maintenance valve at HECW supply to MCR cooler	3	B	P		E1	9.2-3 sh. 1,2,3
F008	6	Maintenance valve at HECW return from MCR cooler	3	B	P		E1	9.2-3 sh. 1,2,3

Table 3.9-8 Inservice Testing Safety-Related Pumps and Valves (Continued)

No.	Qty	Description	Safety Class (a)	Code Cat. (c)	Valve Func (d)	Test Para (e)	Test Freq (f)	Tier 2 Fig.(g)
F009	5 6	Pump suction line maintenance valve	3	B	P		E1	9.2-3 sh. 1,2,3
F010	2	TCV bypass at HECW discharge to MCR cooler	3	B	P		E1	9.2-3 sh. 1,2,3
F011	3	Pump suction line/discharge line PCV maintenance valve	3	B	P		E1	9.2-3 sh. 1,2,3
F012	3	Pump suction line/discharge line PCV	3	B	A	S	E2	9.2-3 sh. 1,2,3
F013	3	Pump suction line/discharge line PCV maintenance valve	3	B	P		E1	9.2-3 sh. 1,2,3
F014	3	Pump suction line/discharge line PCV bypass line	3	B	P		E1	9.2-3 sh. 1,2,3
F015	3	Maintenance valve at HECW supply to C/B Essential Electrical Equipment Room Cooler TCV	3	B	P		E1	9.2-3 sh. 1,2,3
F016	3	HECW supply to C/B Essential Electrical Equipment Room cooler TCV	3	B	A	S	E2	9.2-3 sh. 1,2,3
F017	3	Maintenance valve at HECW supply to C/B Essential Electrical Equipment Room Cooler TCV	3	B	P		E1	9.2-3 sh. 1,2,3
F018	6	HECW supply to C/B Essential Electrical Equipment Room cooler maintenance valve	3	B	P		E1	9.2-3 sh. 1,2,3
F019	6	Maintenance valve at HECW return from C/B Essential Electrical Equipment Room Cooler	3	B	P		E1	9.2-3 sh. 1,2,3
F020	3	TCV bypass valve at HECW supply to C/B Essential Electrical Equipment Room cooler	3	B	P		E1	9.2-3 sh. 1,2,3
F021	3	Maintenance valve at HECW supply to DG zone cooler TCV	3	B	P		E1	9.2-3 sh. 1,2,3
F022	3	HECW supply to DG zone cooler TCV	3	B	A	S	E2	9.2-3 sh. 1,2,3
F023	3	Maintenance valve at HECW supply to DG zone cooler TCV	3	B	P		E1	9.2-3 sh. 1,2,3
F024	6	Maintenance valve at HECW supply to DG zone cooler	3	B	P		E1	9.2-3 sh. 1,2,3

Table 3.9-8 Inservice Testing Safety-Related Pumps and Valves (Continued)

No.	Qty	Description	Safety Class (a)	Code Cat. (c)	Valve Func (d)	Test Para (e)	Test Freq (f)	Tier 2 Fig.(g)
F025	6	Maintenance valve at HECW return from DG zone cooler	3	B	P		E1	9.2-3 sh. 1,2,3
F026	3	TCV bypass valve at HECW supply to DG zone cooler	3	B	P		E1	9.2-3 sh. 1,2,3
F030	3	Chemical addition tank return valve from HECW	3	B	P		E1	9.2-3 sh. 1,2,3
F031	3	Chemical addition tank feed valve to HECW	3	B	P		E1	9.2-3 sh. 1,2,3
F050	2	Make-up Water Purified (MUWP) line to pump suction check valve	3	C	A	S	E2	9.2-3 sh. 1,2,3
F070	5 (handwritten: 6)	Pump discharge line drain valve	3	B	P		E1	9.2-3 sh. 1,2,3
F400	5 (handwritten: 6)	Pump drain line valve	3	B	P		E1	9.2-3 sh. 1,2,3
F401	5 (handwritten: 6)	Pump bearing cooling water needle valve	3	B	P		E1	9.2-3 sh. 1,2,3
F402	3	Refrigerator outlet line sample line valve	3	B	P		E1	9.2-3 sh. 1,2,3
F700	5 (handwritten: 6)	Pump discharge line pressure instrument line root valve	3	B	P		E1	9.2-3 sh. 1,2,3
F701	5 (handwritten: 6)	FE P25-FE003 upstream instrument line root valve	3	B	P		E1	9.2-3 sh. 1,2,3
F702	5 (handwritten: 6)	FE P25-FE003 downstream instrument line root valve	3	B	P		E1	9.2-3 sh. 1,2,3
F703	5 (handwritten: 6)	Pump suction pressure instrument line root valve	3	B	P		E1	9.2-3 sh. 1,2,3
F704	6	Pump suction/discharge line Δp instrument line root valve	3	B	P		E1	9.2-3 sh. 1,2,3

(6) Design features to preclude the adverse effects of water hammer are in accordance with the SRP section addressing the resolution of USI A-1 discussed in NUREG-0927.

These features shall include:

(a) An elevated surge tank to keep the system filled.

(b) Vents provided at all high points in the system.

(c) After any system drainage, venting is assured by personnel training and procedures.

(d) System valves are slow acting.

(7) The HECW System shall be protected from failures of high and medium energy lines as discussed in Section 3.6.

(8) The design operation of the HECW compressors will take into account power or operational perturbations which could result in a) frequent immediate or elongated restarts, b) in unacceptable compressor coolant and lubrication oil interactions, and c) compressor coolant leaks or releases.

(9) The system piping design will take into account unacceptable nil-ductility-temperature conditions associated with normal and transient operation.

9.2.13.2 System Description

The HECW System consists of subsystems in three divisions. Division A ~~has one refrigerator and pump, and Divisions~~ B and C have two refrigerator units, two pumps, instrumentation and distribution piping and valves to corresponding cooling coils. A chemical addition tank is shared by all HECW divisions. Each HECW division shares a surge tank with the corresponding division of the RCW System. The refrigerator capacity is designed to cool the Reactor Building safety-related electrical equipment HVAC Systems and Control Building safety-related equipment area HVAC Systems.

The system is shown in Figure 9.2-3. The refrigerators are located in the Control Building as shown in Figures 1.2-20 and 1.2-21. Each refrigerator unit consists of a evaporator, a compressor, refrigerant, piping, and package chiller controls. This system shares the RCW surge tanks which are in the Reactor Building (Figure 1.2-12). Equipment is listed in Table 9.2-8. Each cooling coil is controlled by a room thermostat. Alternately, flow may be controlled by a temperature control valve. Condenser cooling is from the corresponding division of the RCW System.

Piping and valves for the HECW System, as well as the cooling water lines from the RCW System designed entirely to ASME Code, Section III, Class 3, Quality Group C, Quality

are provisions for resetting the start timers and connecting the HECW pumps to the emergency busses at the proper time if they are not already connected when the LOCA appears.

Power is provided to the HECW refrigerators thirty seconds after it is provided to the HECW pumps. The HECW refrigerators will then begin a programmed startup process.

The HECW system air operated valves will upon loss of instrument air or power assume configurations or positions that assure continued system cooling service.

9.2.13.4 Tests and Inspection

Initial testing of the system includes performance testing of the refrigerators, pumps and coils for conformance with design capacity water flows and heat transfer capabilities. An integrity test is performed on the system upon completion.

The HECW System is designed for periodic pressure and functional testing to assure:

(1) the structural and leaktight integrity by visual inspection of the components;

(2) the operability and the performance of the active components of the system; and

(3) the operability of the system as a whole.

Local display devices are provided to indicate all vital parameters required in testing and inspections. Standby features are periodically tested by initiating the transfer sequence during normal operation.

The refrigerators are tested in accordance with ASHRAE Standard 30. The pumps are tested in accordance with standards of the Hydraulic Institute. ASME Section VIII and TEMA C standards apply to the heat exchangers. The cooling coils are tested in accordance with ASHRAE Standard 33.

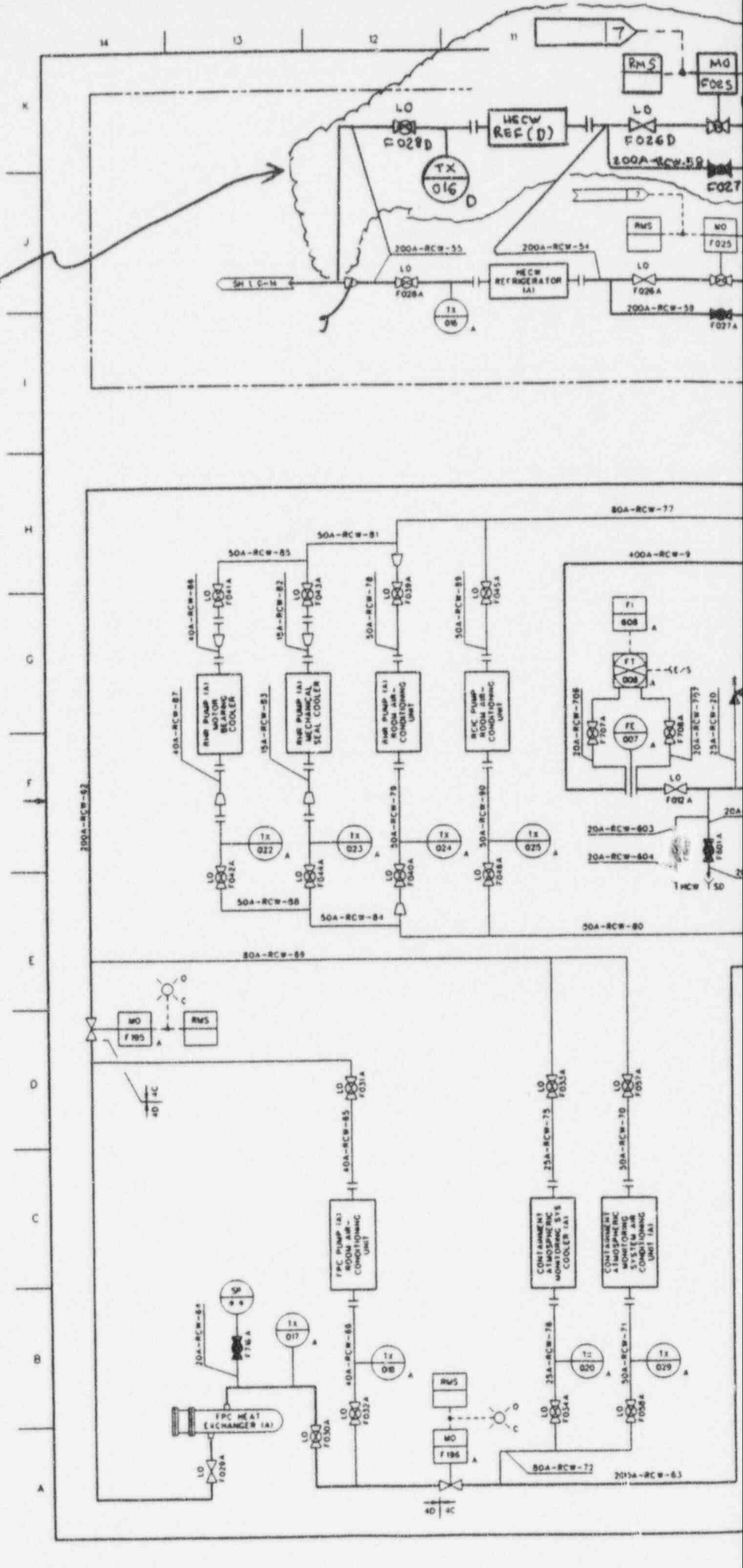
9.2.13.5 Instrumentation and Alarms

A regulated supply of makeup water is provided to add purified water to the surge tanks by water level controls.

The chilled water pumps are controlled from the main control panel. The standby refrigerator has an interlock which automatically starts the standby refrigerator and pump upon failure of the operating unit. ~~in Divisions B and C.~~

The refrigerator units can be controlled individually from the main control room by a remote manual switch. Chilled water temperature is controlled by inlet guide vanes on

ADDITION OF DIVISION "D"



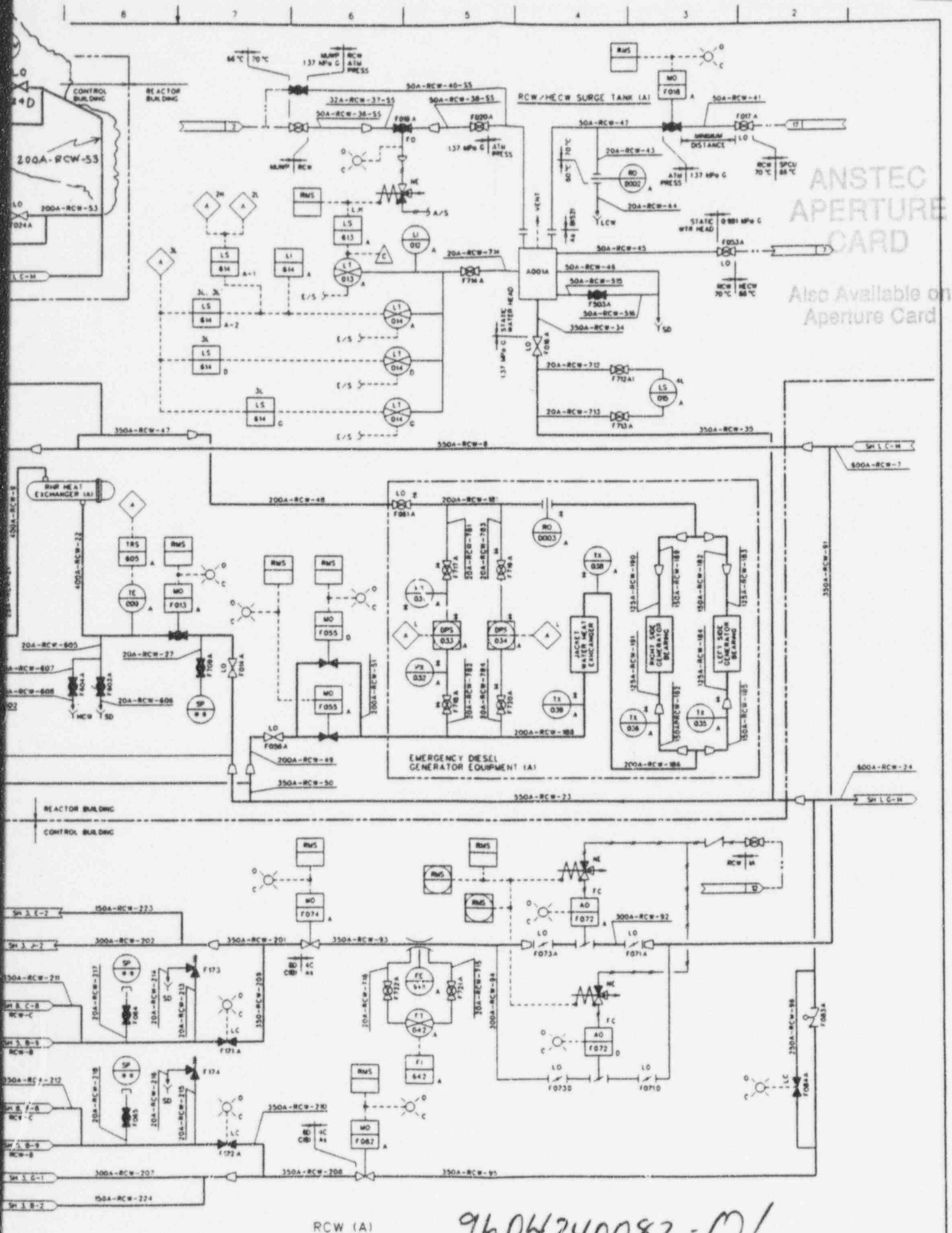
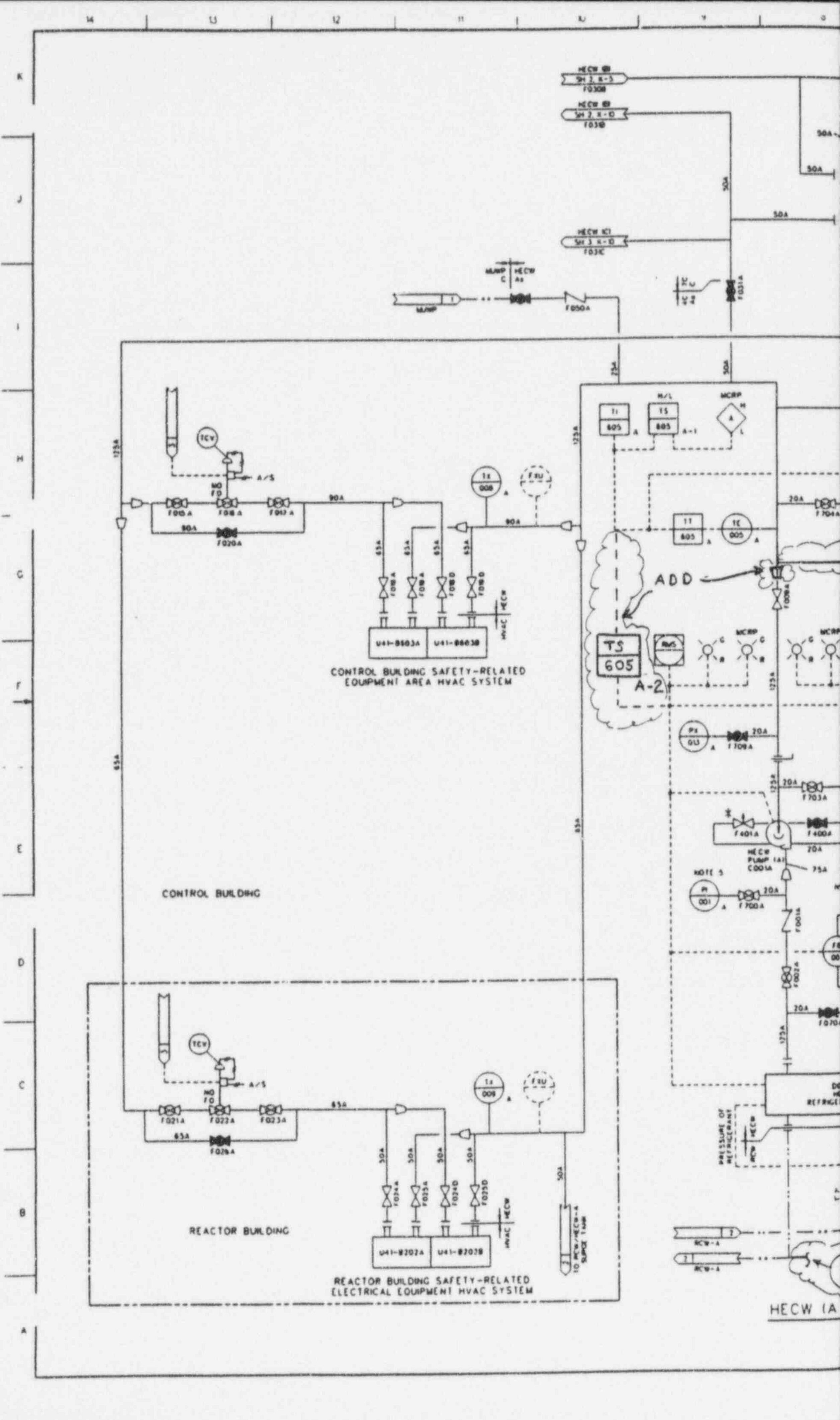
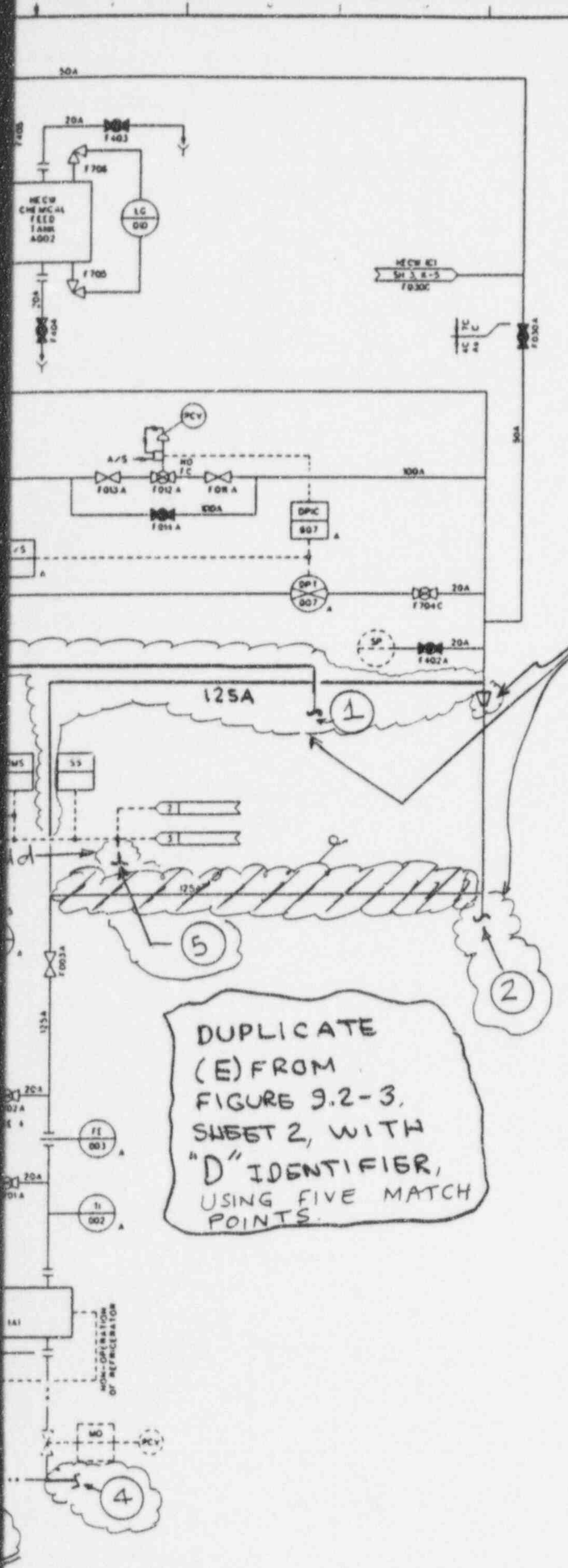


FIGURE 9.2-1 REACTOR BUILDING COOLING WATER SYSTEM P&ID (Sheet 2 of 9)


ADD
TS
605
A-2
TCV
A/S
U41-B603A
U41-B603B
CONTROL BUILDING SAFETY-RELATED
EQUIPMENT AREA HVAC SYSTEM
CONTROL BUILDING
U41-B202A
U41-B202B
REACTOR BUILDING
REACTOR BUILDING SAFETY-RELATED
ELECTRICAL EQUIPMENT HVAC SYSTEM



ADD

NOTES

1 THE FOLLOWING SPECIFICATIONS ARE APPLIED UNLESS OTHERWISE NOTED

GROUP CLASS		4C
DESIGN PRESSURE MPa G		0.981
DESIGN TEMPERATURE (°C)		66
NORMAL OPERATION TEMPERATURE (°C)		7 ~ 17
PIPE WALL THICKNESS	65A ~ 350A	SCH 40
	50A UNDER	SCH 80
PIPE MATERIAL		CS
SEISMIC CLASS		As
FLUID		DEMINERALIZED WATER

2 THESE VALVES SHOULD BE SEPARATED AS FAR AS POSSIBLE FROM THOSE OF F030A, F031A, F030C, F031C

3 "TXU" SIGNIFIES A TEST POINT MEASURING FLOW RATE BY THE ULTRASONIC FLOW RATE INDICATOR

4 THIS FIS CAN INSTALL ON HECW REFRIGERATOR

5 THIS PI CAN CHANGE TO PX

6 CONTROL ROOM HABITABILITY AREA HVAC COOLING COILS ARE FOR HVAC MCR VENTILATOR V601A & V601B RESPECTIVELY

REFERENCE DOCUMENTS	MPL NO
1 MAKEUP WATER SYSTEM (PURIFIED) P&ID	P8-1010
2 REACTOR BUILDING COOLING WATER SYS P&ID	P21-1010
3 HEATING VENTILATING AND AIR CONDITIONING SYS P&ID	U41-1010
4 SAMPLING SYSTEM P&ID	P91-1010
5 PIPING AND INSTRUMENT SYMBOLS DIAGRAM	A10-3030

MPL NO P25-1010

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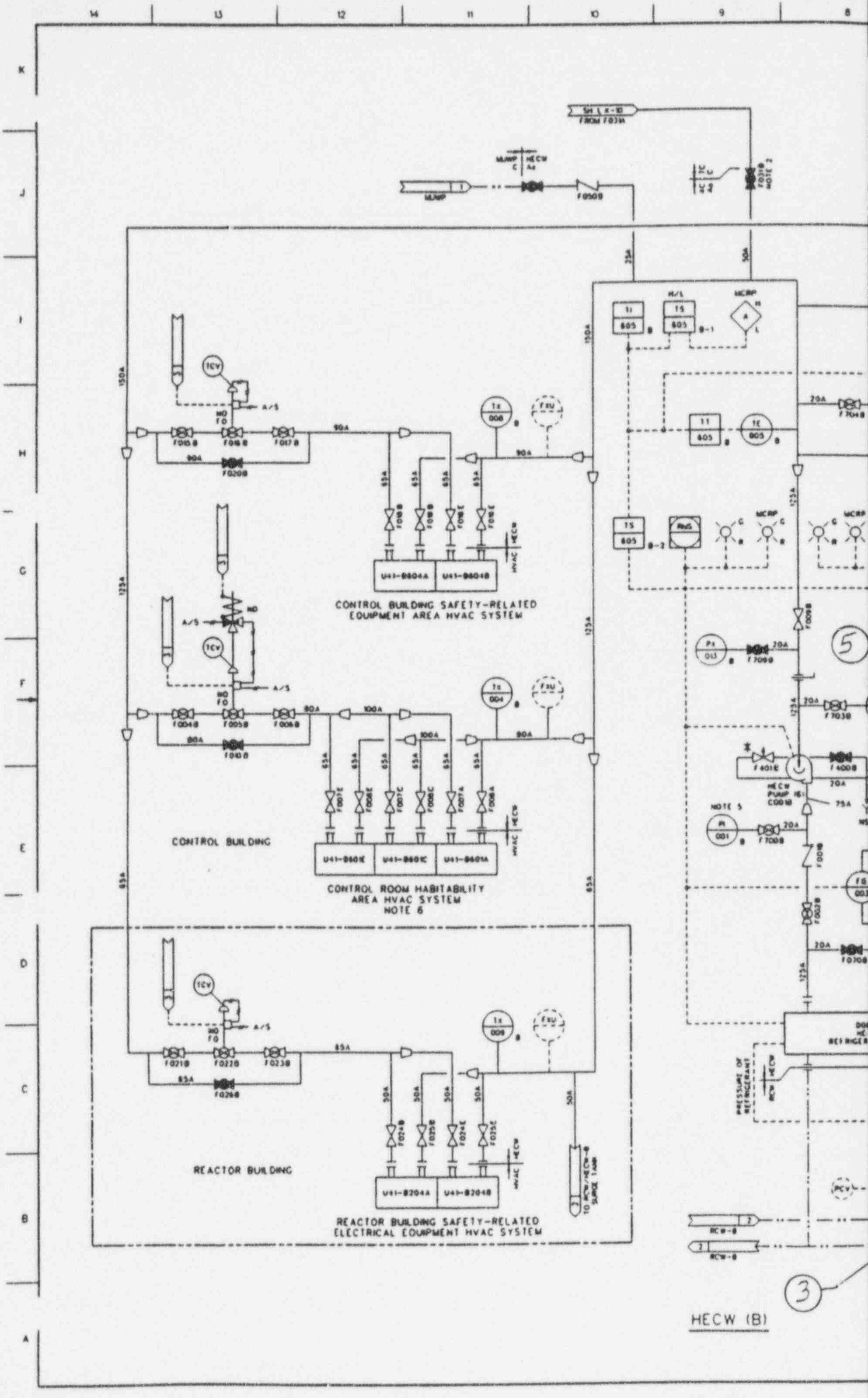
FIGURE 9.2-3 HVAC EMERGENCY COOLING WATER SYSTEM P&ID (Sheet 1 of 3)



CONTROL BUILDING SAFETY-RELATED
EQUIPMENT AREA HVAC SYSTEM
CONTROL BUILDING
CONTROL ROOM HABITABILITY
AREA HVAC SYSTEM
NOTE 6
REACTOR BUILDING
REACTOR BUILDING SAFETY-RELATED
ELECTRICAL EQUIPMENT HVAC SYSTEM
HECW (B)

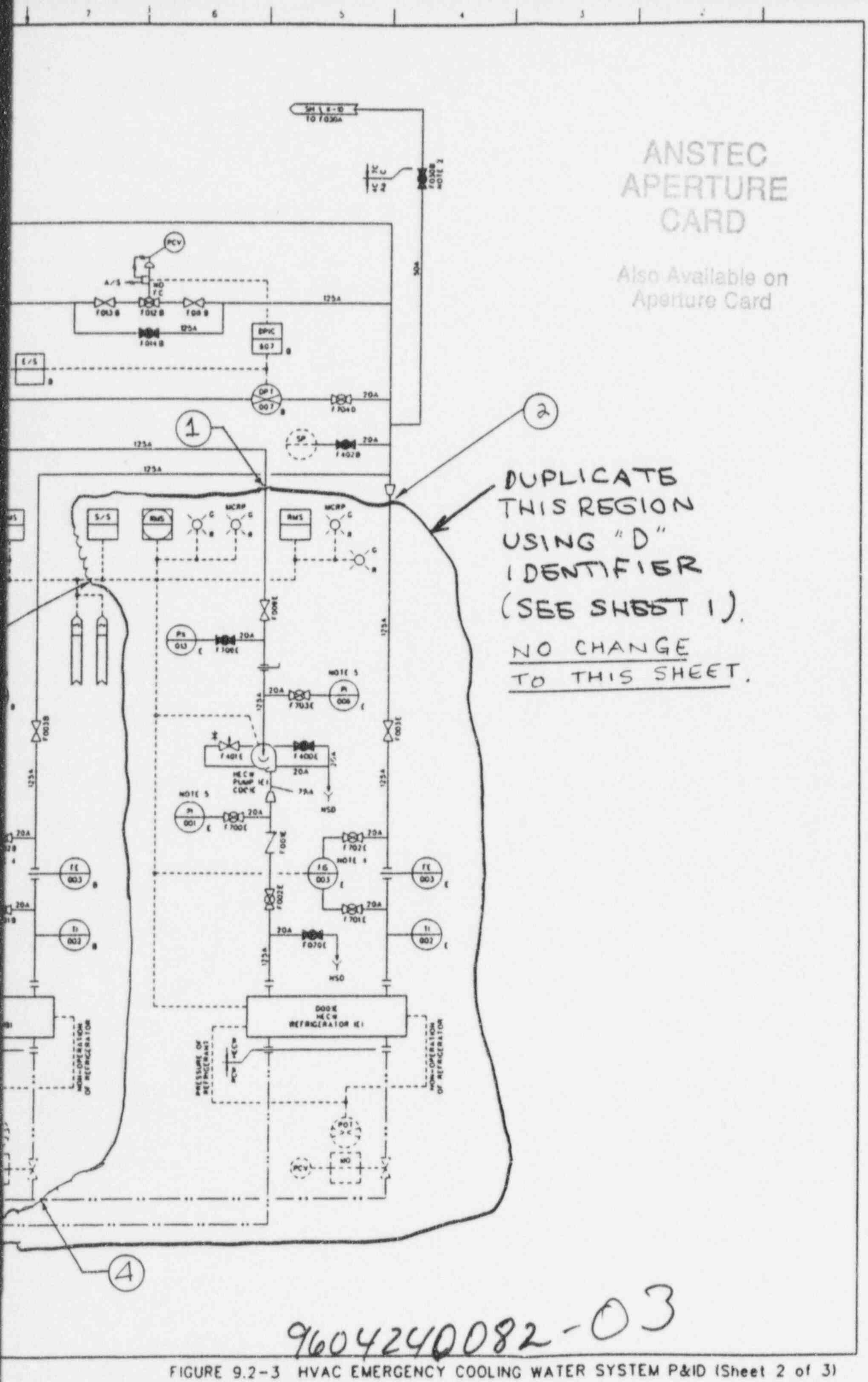


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FIGURE 9.2-3 HVAC EMERGENCY COOLING WATER SYSTEM P&ID (Sheet 2 of 3)

PROPOSED CHANGES

CHANGE PACKAGE NO. 3

Change of Smoke Removal Method and Duct Connections

In the high radiation mode, a positive pressure of at least 3.2 mm water gauge is maintained in the MCAE relative to the outside atmosphere. Each emergency filtration unit treats a mixture of MCAE recirculated air and outside makeup air to maintain the positive pressure with not more than 360 m^3 per hour (@ one atmosphere absolute pressure, 0°C) of outside air.

The redundant division of the CRHA HVAC System starts on a low flow signal from the operating emergency filtration unit. The redundant division is connected to an outside air intake, which is separated from the other intake by a minimum of 50m.

Outside Smoke Mode

When smoke detection sensors in the operating outside air intake detect smoke, a signal will initiate MCAE air recirculation by isolating the outside air intake, closing the exhaust damper and stopping the exhaust fan.

Smoke Removal Mode

The smoke removal mode is manually initiated by closing the recirculation damper, ~~stopping the exhaust fan, and opening the exhaust fan bypass damper to allow outside air purging of the MCAE.~~ and starting both exhaust fans at high speed in conjunction with a supply fan.

The remaining discussion in this section is not mode-specific and applies (unless stated otherwise) to the entire CRHA HVAC System.

MCAE temperature is maintained between 21°C and 26°C, with a relative humidity between 10% and 60%, except when in the smoke removal mode.

The CRHA HVAC System is classified as Seismic Category I. The CRHA HVAC System is located in the Control Building.

Each of the two CRHA HVAC System divisions is powered from the respective Class 1E division as shown on Figure 2.15.5a. In the CRHA HVAC System, independence is provided between Class 1E divisions, and also between the Class 1E divisions, and non-Class 1E equipment.

Each mechanical division of the CRHA HVAC System (Divisions B and C) is physically separated from the other division, except for the common ducts in the MCAE.

Fire dampers with fusible links in HVAC duct work close under air flow conditions.

The CRHA HVAC System has the following displays and controls in the main control room:

(1) Controls and status indication for the active safety-related components shown on Figure 2.15.5a.

Hydrogen concentration is maintained at less than 2% by volume in the battery rooms.

Smoke Removal Mode

The smoke removal mode is manually initiated by closing the recirculation damper, and starting both exhaust fans in conjunction with a supply fan ~~stopping the exhaust fan, and opening the exhaust fan bypass damper~~ to allow outside air purging of the affected Control Building area. The normal operating mode is used to remove smoke from the battery rooms.

The remaining discussion in this section is not mode-specific and applies (unless stated otherwise) to the entire CBSREA HVAC System.

The CBSREA HVAC System is classified as Seismic Category I, except for the non-safety-related fan coil units. The CBSREA HVAC System is located in the Control Building.

Each of the three CBSREA HVAC System divisions is powered from the respective Class 1E division as shown on Figures 2.15.5b, 2.15.5c and 2.15.5d. In the CBSREA HVAC System, independence is provided between Class 1E divisions, and also between the Class 1E divisions and non-Class 1E equipment.

Each mechanical division of the CBSREA HVAC System (Divisions A, B and C) is physically separated from the other divisions. CBSREA HVAC System Division B duct penetrations of Division IV firewalls are provided with fire dampers.

Fire dampers with fusible links in HVAC duct work close under air flow conditions.

The CBSREA HVAC System has the following displays and controls in the main control room:

(1) Controls and status indication for the active safety-related components shown on Figures 2.15.5b, 2.15.5c and 2.15.5d.

(2) Parameter displays for the instruments shown on Figures 2.15.5b, 2.15.5c and 2.15.5d.

Reactor Building HVAC System

The Reactor Building (R/B) HVAC System provides a controlled environment for the operation of equipment in the Reactor Building.

The Reactor Building HVAC System consists of three independent safety-related divisions. Each division is composed of the following systems:

(1) R/B Safety-Related Equipment HVAC System.

(2) R/B Safety-Related Electrical Equipment HVAC System.

The R/B Safety-Related Equipment HVAC System has the following displays and controls in the main control room:

(1) Controls and status indication for the FCUs shown on Figure 2.15.5e.

The safety-related electrical equipment shown on Figure 2.15.5e located in the Reactor Building is qualified for a harsh environment.

R/B Safety-Related Electrical Equipment HVAC System

The R/B Safety-Related Electrical Equipment HVAC System provides cooling of safety-related electrical equipment areas, and consists of three independent divisions. Each division consists of an air conditioning unit with two supply fans, and two exhaust fans. Figures 2.15.5f, 2.15.5g, and 2.15.5h show the basic system configuration and scope.

The R/B Safety-Related Electrical Equipment HVAC System is classified as safety-related.

Normal Operating Mode

In the normal operating mode, the air conditioning unit, one supply fan, and one exhaust fan of each division operate. The exhaust fan automatically starts when the supply fan is started.

In the areas served by the R/B Safety-Related Electrical Equipment HVAC System temperature is maintained below 40°C, except in the diesel generator (DG) engine rooms during DG operation.

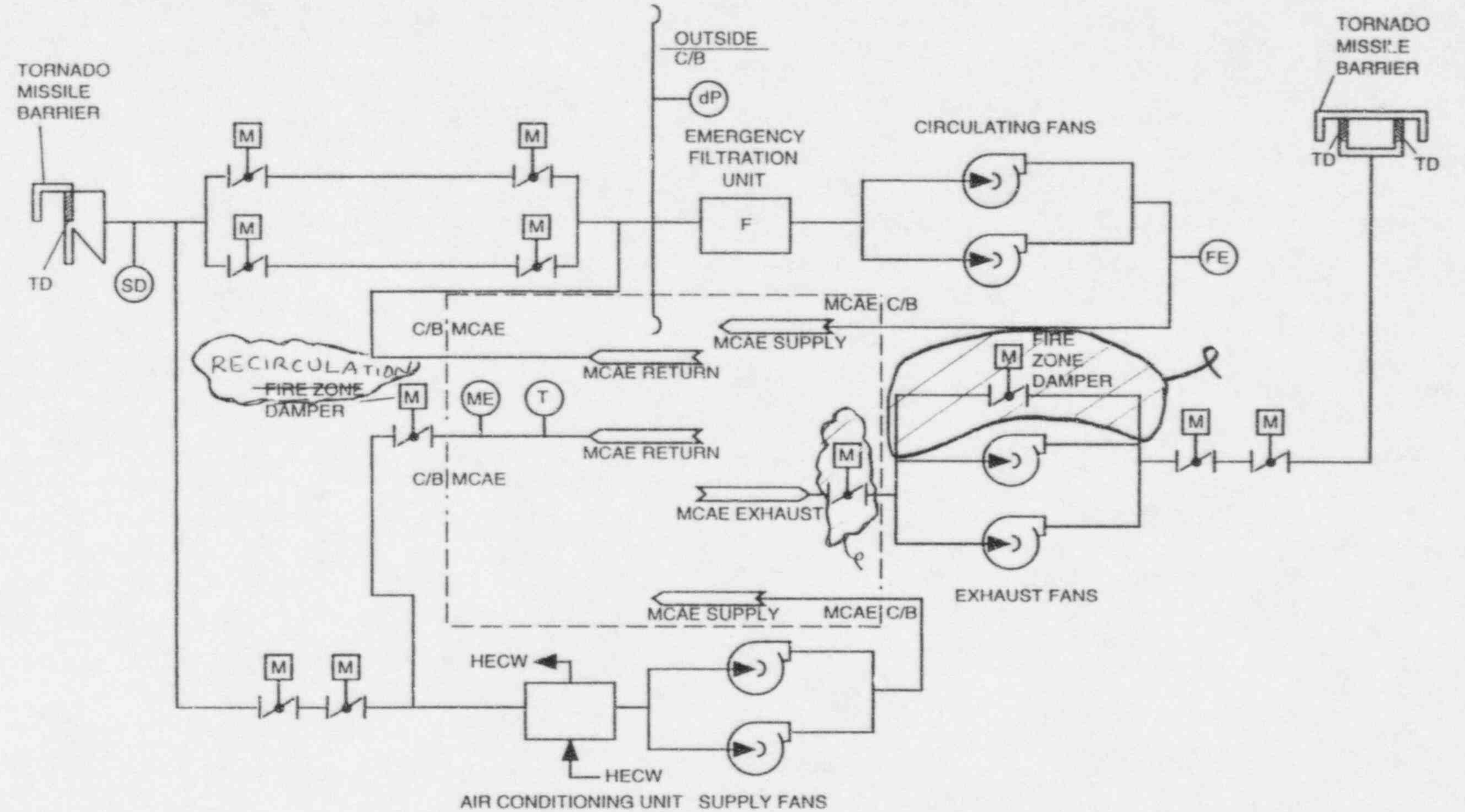
Smoke Removal Mode

The smoke removal mode is manually initiated by closing the recirculation damper, stopping the exhaust fan, and opening the exhaust fan bypass damper to allow outside air purging of the affected area. The normal operating mode is used to remove smoke from the DG day tank rooms.

The R/B Safety-Related Electrical Equipment HVAC System is classified as Seismic Category I. The R/B Safety-Related Electrical Equipment HVAC System is located in the Reactor Building.

Each of the three divisions of the R/B Safety-Related Electrical Equipment HVAC System is powered from the respective Class 1E division as shown on Figures 2.15.5f, 2.15.5g, and 2.15.5h. In the R/B Safety-Related Electrical Equipment HVAC System, independence is provided between Class 1E divisions, and also between the Class 1E divisions and non-Class 1E equipment.

Each mechanical division of the R/B Safety-Related Electrical Equipment HVAC System (Divisions A, B, C) is physically separated from the other divisions.



NOTES:
1. THIS FIGURE SHOWS ONE OF TWO IDENTICAL DIVISIONS. ELECTRICAL POWER LOADS FOR THE COMPONENTS OF DIVISION B ARE POWERED FROM CLASS 1E DIVISION II. ELECTRICAL POWER LOADS FOR THE COMPONENTS OF DIVISION C ARE POWERED FROM CLASS 1E DIVISION III.

Figure 2.15.5a Control Room Habitability Area HVAC System

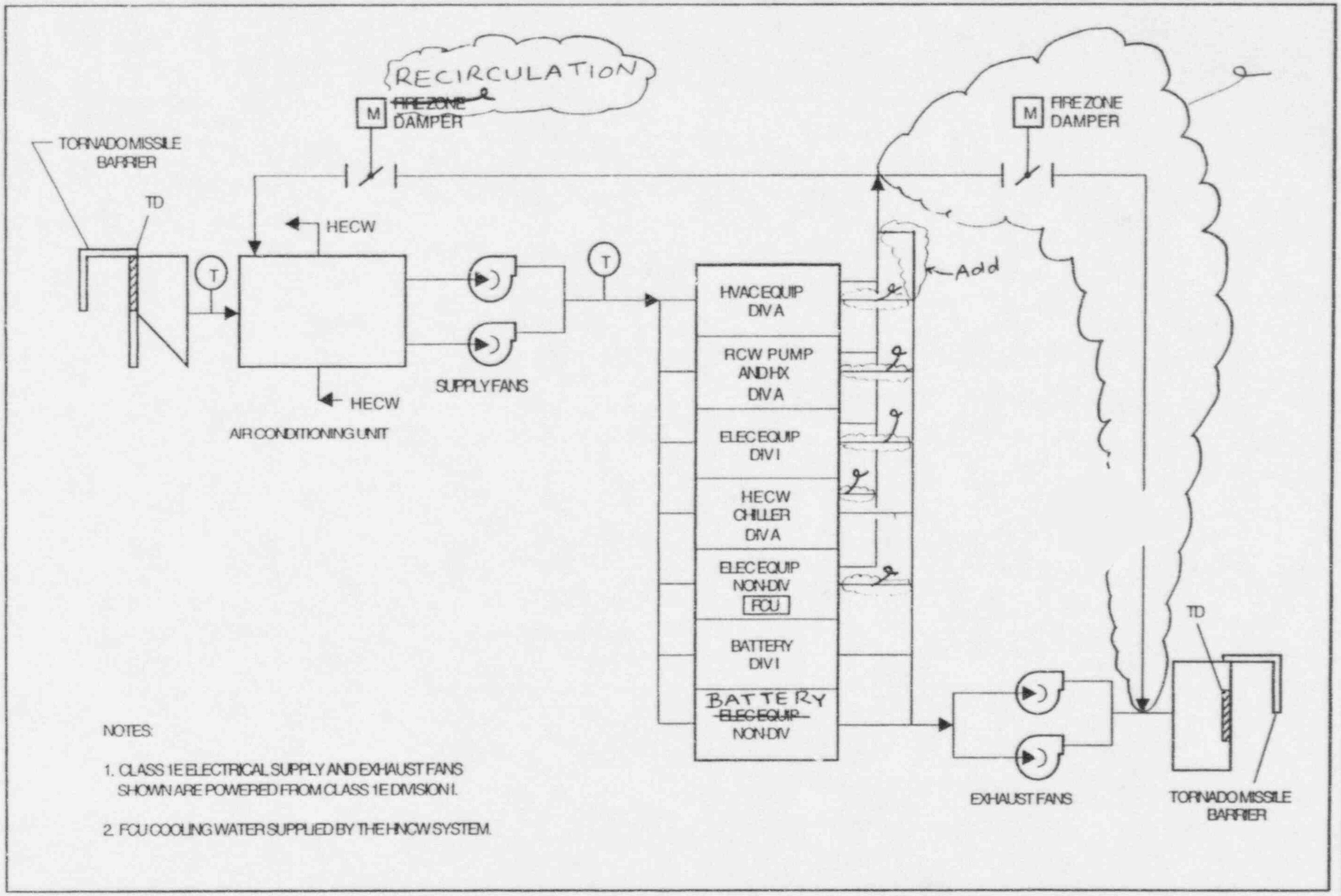
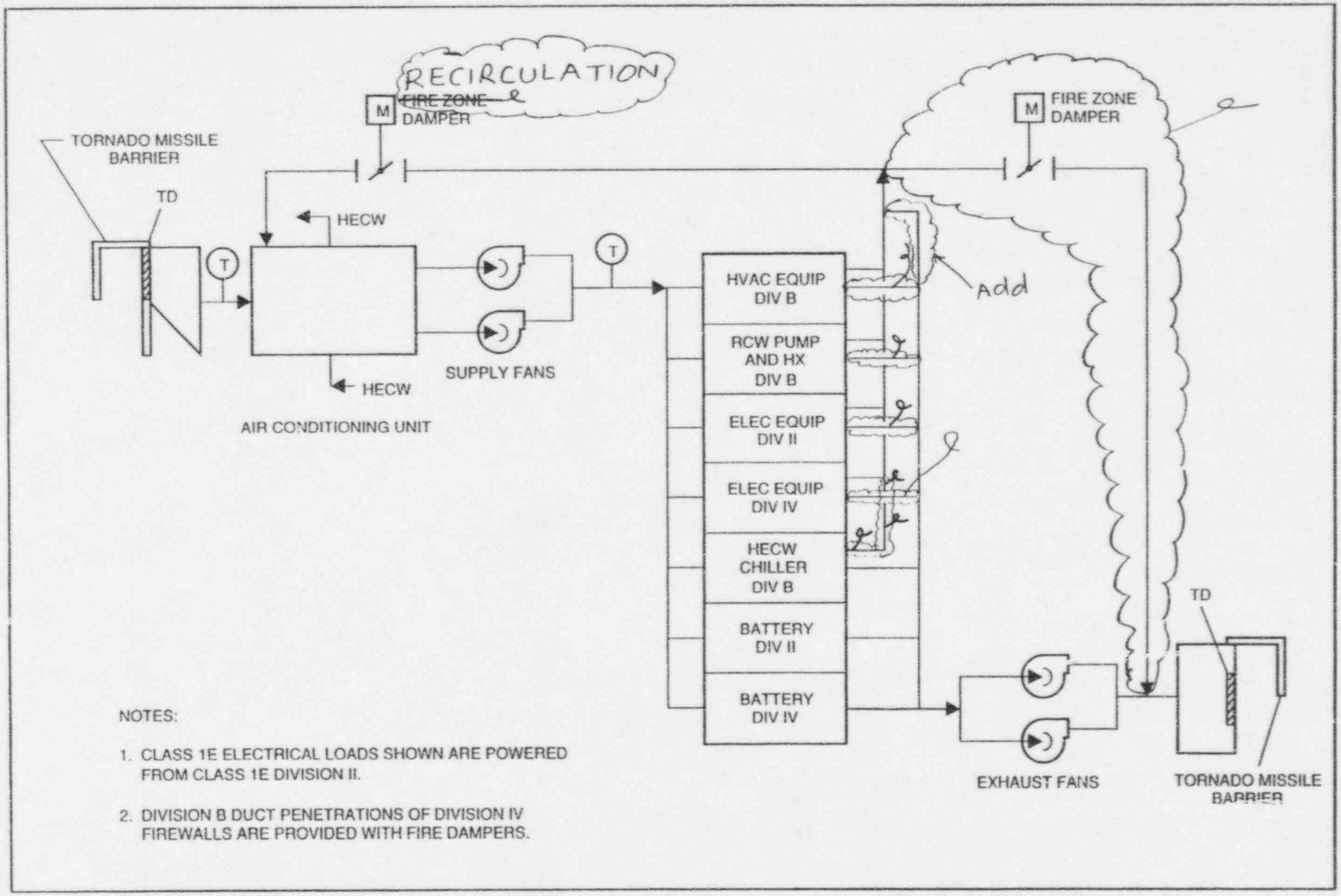


Figure 2.15.5b Control Building Safety-Related Equipment Area HVAC System (Division A)



NOTES:

1. CLASS 1E ELECTRICAL LOADS SHOWN ARE POWERED FROM CLASS 1E DIVISION II.
2. DIVISION B DUCT PENETRATIONS OF DIVISION IV FIREWALLS ARE PROVIDED WITH FIRE DAMPERS.

Figure 2.15.5c Control Building Safety-Related Equipment Area HVAC System (Division B)

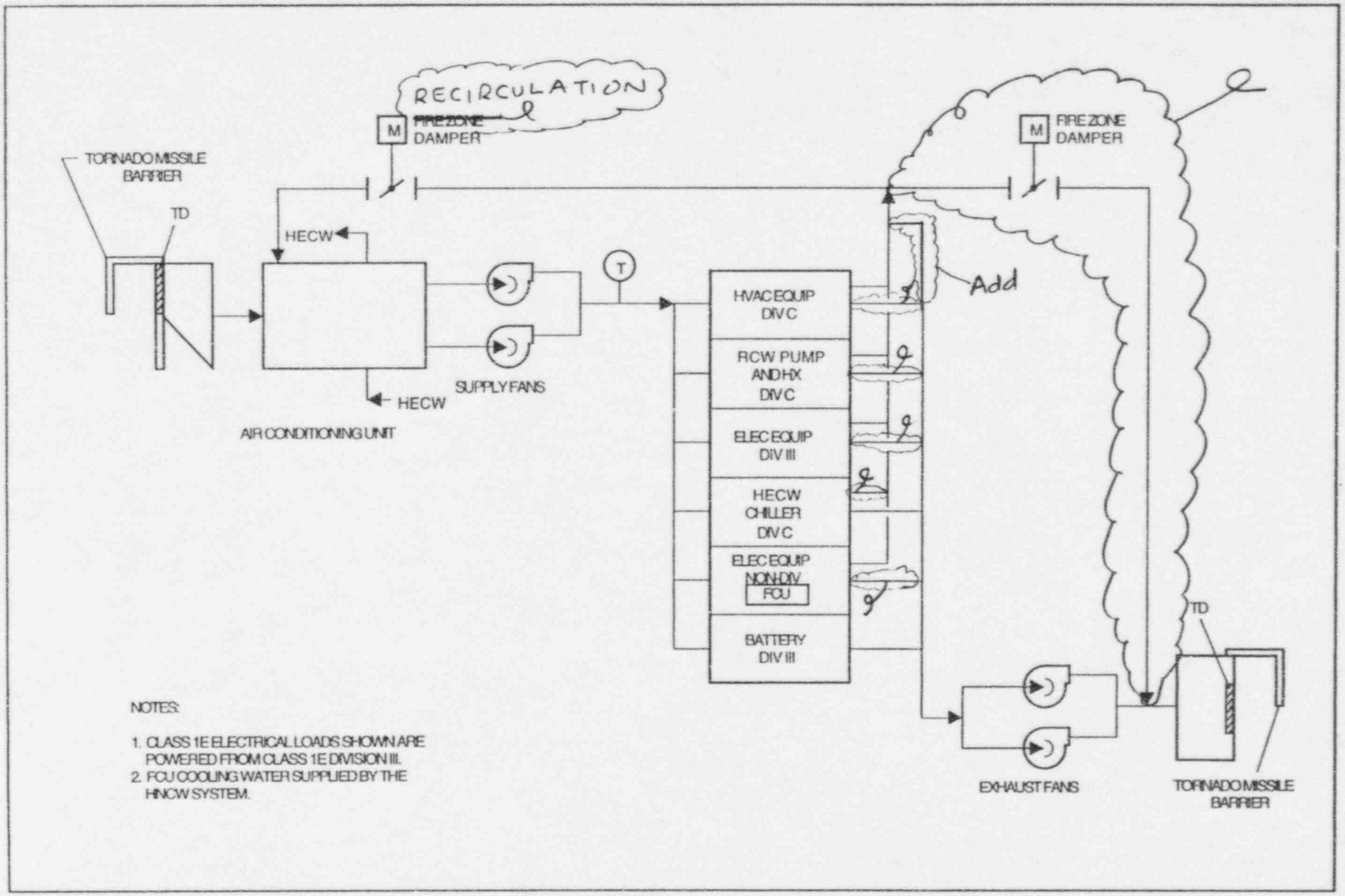
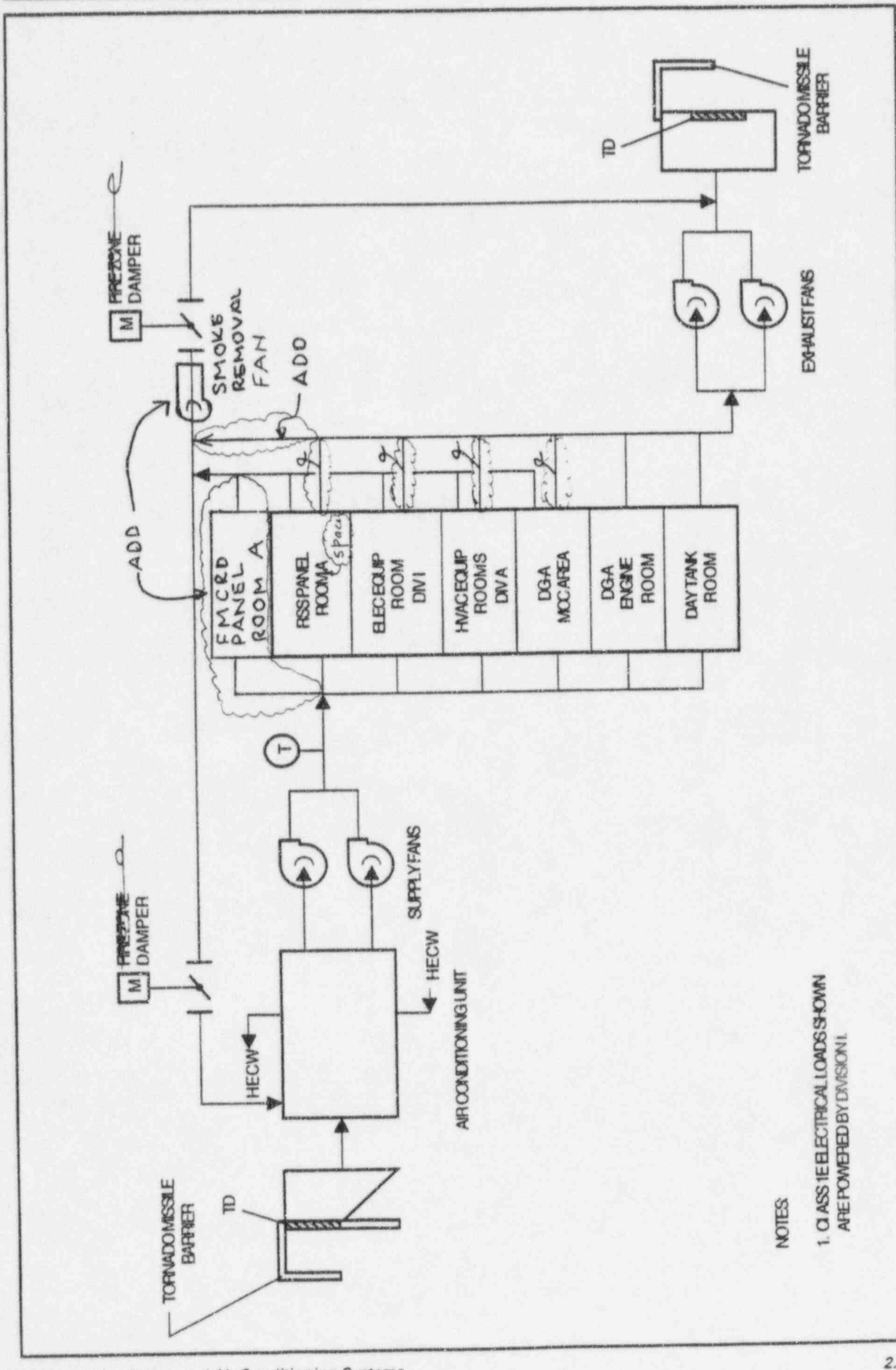


Figure 2.15.5d Control Building Safety-Related Equipment Area HVAC System (Division C)



NOTES

1. CLASS 1E ELECTRICAL LOADS SHOWN ARE POWERED BY DIVISION I.

Figure 2.15.5f Reactor Building Safety-Related Electrical Equipment HVAC System (Division A)

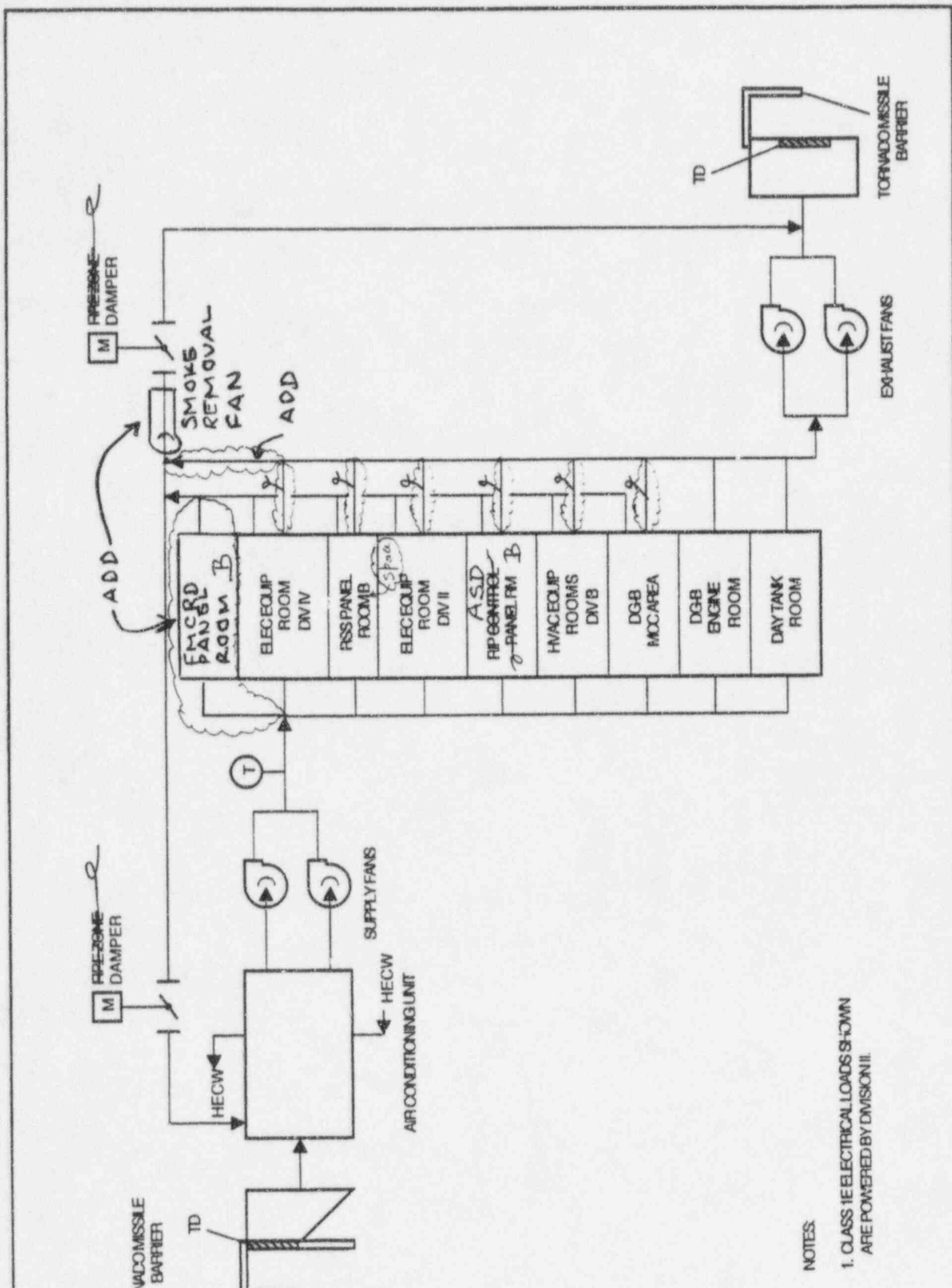


Figure 2.15.5g Reactor Building Safety-Related Electrical Equipment HVAC System (Division B)

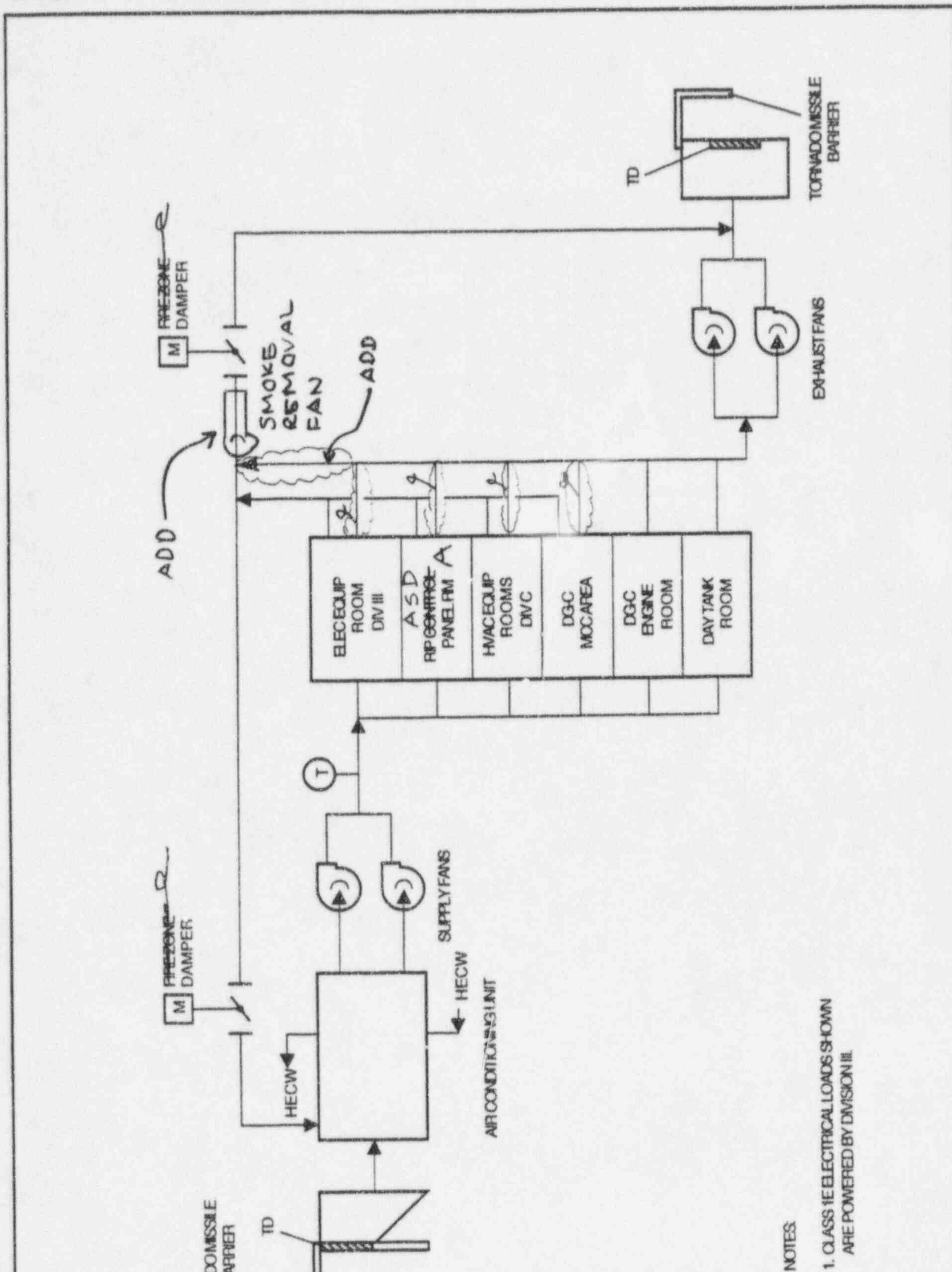


Figure 2.15.5h Reactor Building Safety-Related Electrical Equipment HVAC System (Division C)

Emergency conditions such as a LOCA or high radiation cause an automatic changeover reducing outside air intake and to start charcoal filtering all outside air and a portion of the return air. This effectively isolates operating personnel from the environment and from airborne contamination. Protection from direct radiation is discussed in Subsection 6.4.2.5.

Detection of radioactivity is instrumented, and changeover to reduced circulation and charcoal filtering is automatic. Redundancy of instrumentation and air handling systems ensures against system failure due to single component failure.

The above operational description is brief. For a more detailed description of normal and emergency operation of the control room habitability systems, see Subsections 9.4.1, 9.5.1, 9.5.3, 12.3.4, 6.5.1, and Chapter 8.

6.4.4 Design Evaluations

6.4.4.1 Radiological Protection

The Chi/Qs used for evaluation of the control room operator dose to meet General Design Criterion 19 are presented in Subsection 15.6.5.

6.4.4.2 Smoke and Toxic Gas Protection

As discussed and evaluated in Subsection 9.5.1, the use of non-combustible construction and heat- and flame-resistant materials throughout the plant minimizes the likelihood of fire and consequential fouling of the main control area envelope atmosphere with smoke or noxious vapor introduced in to the control room air. In the smoke removal mode, the purge flow through the Control Building provides three air changes per hour in order to sweep atmospheric contaminants out of the area.

The main control area envelope is normally exhausted from the recirculation plenum by one of the exhaust fans. Smoke removal is accomplished by ~~stopping the exhaust fans~~ starting both exhaust fans at high speed in conjunction with a supply fan; and realigning the dampers for exhausting directly to the exhaust vent. ~~Thus, 100% fresh air is circulated and exhausted by pressurization to clear the smoke.~~ The above changeover is under manual control from the main control room. Operating personnel in the control room exercise this option in response to signals from the smoke detection sensors located in the subject spaces and in the associated ductwork.

Transfer of the system to the isolation mode for exterior smoke may also be initiated manually from the control room. Local, audible alarms warn the operators to shut the self-closing doors, if, for some reason, they are held open after the receipt of a transfer signal. Isolation mode makeup air flow, required after approximately 72 hours of isolation (based on the buildup of carbon dioxide to 1% by volume in the space due to the respiration of 12 persons), must be initiated manually by the operator after tests with portable air analyzers indicate the need to do so. However, the operator is allowed

both exhaust fans are started at high speed in conjunction with a supply fan

The safety-related isolation valves at the outside air intakes are protected from becoming inoperable due to freezing, icing, or other environmental conditions.

Upon detection of smoke in the CRHA, the operating division of the HVAC System is put into smoke removal mode by the main control room operators. For smoke removal, ~~the exhaust fan is stopped~~, the recirculation ~~duct valve~~ damper is closed~~, and the fan bypass valve is opened~~. Either division of the CRHA HVAC System can be used as a smoke removal system.

9.4.1.1.5 Inspection and Testing Requirements

Provisions are made for periodic tests of the emergency filtration unit fans and filters. These tests include measurement of differential pressure across the filter and of filter efficiency. Connections for testing, such as injection, sampling and monitoring, are properly located so that test results are indicative of performance.

The high-efficiency particulate air (HEPA) filters of the CRHA HVAC System shall be tested periodically with dioctyl phthalate smoke (DOP). The charcoal filters will be periodically tested with an acceptable gas for bypasses. Removal efficiency shall be at least 95% for all forms of iodine (elemental, organic, particulate and HI, hydrogen iodide in the influent system).

Each emergency filtration division duct work outside MCAE shall be periodically tested for unfiltered inleakage in accordance with ASME N510.

Each emergency filtration division shall be periodically inspected for open maintenance access doors or deteriorated seals that could lead to charcoal filter bypass.

The balance of the system is proven operable by its use during normal plant operation. Portions of the system normally closed to flow can be tested to ensure operability and integrity of the system.

9.4.1.1.6 Instrumentation Application

One of two air conditioning unit supply fans is started manually.

A high radiation signal automatically starts the emergency air filtration fan, closes the normal CRHA HVAC System air inlet dampers and closes the exhaust air dampers and stops the exhaust fan.

A temperature indicating controller senses the temperature of the air leaving the emergency filtration system. The controller then modulates an electric heating coil to maintain the leaving air temperature at a preset limit. A limit switch will cause an alarm to be actuated on high air temperature. A moisture-sensing element, working in conjunction with the temperature controller, measures the relative humidity of the air entering the charcoal adsorber.

both exhaust fans are started in conjunction with a supply fan.

One of the safety-related electrical equipment area exhaust fans starts automatically when the air-conditioning unit supply fan is started.

On a smoke alarm in a division of the Control Building safety-related electrical equipment area HVAC System, that division of the HVAC System shall be put into smoke removal mode. No other division is affected by this action. For smoke removal, the recirculation duct damper is closed, ~~the fan bypass damper opened~~, and ~~the exhaust fan stopped~~. Normal once through ventilation of the battery rooms also removes smoke from the battery rooms.

Fire dampers separating electrical divisions II and IV rooms that use fusible links in HVAC ductwork will close under airflow conditions after fusible link melts.

9.4.2 Spent Fuel Pool Area HVAC System

The Spent Fuel Pool Area HVAC System is part of the Reactor Building secondary containment HVAC System described in Subsection 9.4.5.1.

9.4.3 Auxilary Area HVAC System

The Auxilary Area HVAC System is also part of the Reactor Building Secondary Containment HVAC System described in Subsection 9.4.5.1.

9.4.4 Turbine Island HVAC System

The Turbine Island heating, ventilating, and air conditioning system consists of the Turbine Building (T/B) HVAC System and the Electrical Building (E/B) HVAC System.

9.4.4.1 Design Bases

9.4.4.1.1 Safety Design Bases

The T/B HVAC and E/B HVAC Systems do not serve or support any safety function and have no safety design bases

9.4.4.1.2 Power Generation Design Bases

(1) The T/B HVAC and E/B HVAC are designed to supply filtered and tempered air to all Turbine Island spaces during all modes of normal plant operation, including plant startup and shutdown. The systems are also designed to maintain inside air temperatures above 15°C and below the following upper design limits:

- General Turbine Building areas: 40°C
- Condenser compartment: 43°C

All major components are tested and inspected as separate components prior to installation to ensure design performance. The system is preoperationally tested in accordance with the requirements of Chapter 14.

9.4.5.3.5 Instrumentation Application

The R/B Non-safety-related Equipment HVAC System starts manually.

9.4.5.4 R/B Safety-Related Electrical Equipment HVAC System

9.4.5.4.1 Design Bases

9.4.5.4.1.1 Safety Design Bases

The R/B Safety-Related Electrical Equipment HVAC System is designed to provide a controlled temperature environment to ensure the continued operation of safety-related equipment under accident conditions. The rooms cooled by the R/B Safety-Related Electrical Equipment HVAC System are maintained at positive pressure relative to atmosphere during normal and accident conditions. This is achieved by sizing intake fans larger than exhaust fans.

The power supplies to the HVAC systems for the R/B safety-related electrical equipment rooms allow uninterrupted operation in the event of loss of normal offsite power.

The system and components are located in a Seismic Category I structure that are tornado-missile, and flood protected, including tornado missile barriers on intake and exhaust structures.

For compliance with code standards and regulatory guides, see Sections 3.2 and 1.8.

On a smoke alarm in a division of the Reactor Building Safety-Related Electrical Equipment HVAC System, that division of the HVAC System shall be put into smoke removal mode manually. No other division is affected by this action. For smoke removal, the recirculation damper is closed, the exhaust fan bypass damper opened, ~~and~~ the exhaust fan is stopped. Normal once through ventilation of the day tank rooms also removes smoke from the day tank rooms.

and the smoke removal fan is started

in conjunction with the supply fan.

The intake louvers are located at 15.2m above grade. The exhaust louvers are located at 13.3m above grade. (See general arrangement layout, Figures 1.2-10 and 1.2-11.)

9.4.5.4.1.2 Power Generation Design Bases

The system is designed to provide an environment with controlled temperature and humidity to ensure both the comfort and safety of plant personnel and the integrity of safety-related electrical equipment. The system is designed to facilitate periodic inspection of the principal system components.

A single non-safety-related HVAC System supplies normal cooling for secondary containment in the Reactor Building. Within the Reactor Building the system is branched into three separate systems with valves and fire dampers for each branch (Subsection 9.5.5). Required emergency cooling for safety-related systems is provided by room coolers on a divisional basis.

9.5.1.1.6 Smoke Control System

The smoke control system for the plant provides major features as follows:

(1) Venting of fire areas to prevent undue buildup of pressure due to a fire.

(2) Pressure control across the fire barriers to assure that any leakage is into the fire area experiencing the fire.

(3) Pressure control and purge air supply to prevent back-flow of smoke and hot gases when fire barrier doors are maintained open for access for manual fire suppression activities.

(4) Augmented and directed clean air supply to provide a clean air path to the fire for fire suppression personnel.

(5) Smoke control by fans and systems external to the fire area experiencing the fire.

(6) Removal of smoke and heat from the fire by fans operating ~~to~~ supply clean, cool air.

(7) ~~Generally no~~ fire dampers in the smoke removal path.

These features are provided by designing the HVAC Systems for the dual purpose of HVAC and smoke control. ASHRAE's "Design of Smoke Control Systems for Buildings" and NFPA's "Recommended Practice for Smoke Control Systems" (References 9.5-3 and 9.5-4) were used as the basis for the design of the smoke control features of the combined systems.

The normal operating modes of the HVAC Systems are shown in Figures 9.4-1 through 9.4-6. The pressure at the input of an air handling unit is held at atmospheric pressure by a ducted, direct supply from outside through a bag type filter.

The systems are designed so the division of the air flow to the rooms within an HVAC/fire area is determined by the supply ducting and ~~its~~ adjustable volume dampers. ~~The exhaust/return system is a low loss, low velocity plenum system with a single adjustable volume damper located just upstream of the return to the air handling unit. Adjusting the return volume damper primarily affects room pressures, but not the~~

flow split between rooms in the fire area. Total flow will vary somewhat as the volume damper is adjusted, due to the sloping characteristic of the supply/recirculation fan.

If a fire is detected in a fire area, a dual damper adjusts to convert the system from a recirculation system to a once-through system by opening a discharge path to the atmosphere upstream of the volume damper in the recirculation return duct. The damper also closes off the recirculation return duct to block recirculation of combustion products. This allows the pressure in the fire area experiencing the fire to decay back to the duct loss above atmospheric pressure. The recirculation fans continue to operate in the once-through mode to supply cool, clean air to cool and remove smoke from the area experiencing the fire. The HVAC Systems in the fire areas not experiencing a fire continue to operate in their normal fashion so that the pressure in the other fire areas remains at the normal approximately 6.4 mm of water positive value. This assures that air leakage through any openings in the fire barriers surrounding the fire is to the fire.

The magnitude of the differential pressure which must be maintained across a fire barrier to provide adequate smoke control varies with the intensity of the fire and the room height. For this reason, it is a COL license information requirement (Subsection 9.5.13.10) that the required differential pressure value for each barrier be calculated during the detailed design phase and the HVAC Systems be designed to provide the required pressure. Normally the differential pressure would not have to be more than about 4.6 mm of water, and it most likely would be less.

If a HVAC system operating in its normal mode is not capable of supplying the required differential pressure, there are corrective options available to the detail designer. It may be necessary to specify that during a fire situation, both recirculation fans must be run in each fire area not experiencing the fire. If this is still not adequate, it may then be necessary to supply motor-operated volume dampers in place of the manually adjustable dampers in the recirculation return lines to temporarily increase zone pressures in the fire areas not experiencing a fire. It is an COL license information requirement (Subsection 9.5.13.10) that the required pressures be calculated during the detailed design phase, the HVAC Systems be designed to provide the required pressure, and that the capability be confirmed during pre-operational testing.

Entry to a fire is gained from an adjacent fire area which by design is at a positive pressure with respect to the area experiencing the fire. The pressure differential is sufficient to provide adequate velocity through the open door to carry the combustion products back into the zone of the fire. The flow through the open door into the area of the fire and out the area of the fire's exhaust duct system is maintained by the positive pressure of the non-fire area. Because of the low loss exhaust duct system, a flow reversal could occur in the exhaust duct of the area without the fire. A portion, or even the entire, recirculation flow for the fire area without the fire will reverse flow through the

entry room return register and through the open door into the zone experiencing the fire. This not only prevents the flow of combustion products to the non-fire area but provides a plume of clean, cool air for fire suppression personnel to follow into the area of the fire. It gives them a tenable environment from which to work.

Since the HVAC Systems are manually switched over to a once-through system during a fire, there is no direct mixing of smoke from room to room within the fire area. There may be some leakage through normal HVAC seals and other cracks or openings in the walls. The venting provided by the unrestricted exhaust system prevents pressurization of the fire area, and thus minimizes smoke leakage to rooms adjacent to the fire.

The HVAC supply and exhaust systems are designed so that they will continue to vent the fire area experiencing a fire, regardless of the intensity or magnitude of the fire. Except within the Reactor Building secondary containment, there are no fire dampers in the HVAC Systems for the Reactor or Control buildings. This is possible because there are ~~no~~ HVAC penetrations of building internal walls between safety-related fire areas ~~so that no fire dampers are required for internal HVAC ducts.~~ fire dampers in the

In order to maintain the objective of smoke and heat removal during a fire situation, the HVAC supply and exhaust duct openings in the exterior walls of the Reactor building do not have fire dampers. The walls are designated as three-hour fire barriers and would normally require fire dampers for HVAC duct penetrations. Fire dampers could close due to heat from an internal fire, however. Internal fires are a more serious threat to the plant than external fires.

Omission of the fire dampers in the supply ducts is deemed acceptable because:

(1) Each HVAC/fire area has a separate intake structure.

(2) The intake structures are dispersed around the perimeters of the buildings.

(3) Not Used

(4) Isolation valves are provided and could be manually closed should there be a challenge due to an external fire.

(5) Each intake serves one fire area and, therefore, one division only except for the control room. The two redundant divisions are in separate fire areas. The control room fire area is separate from all other fire areas and the safe shutdown function is backed up by the remote shutdown panel.

Omission of the fire dampers in the exhaust ducts is deemed acceptable because:

(1) Each HVAC/fire area has a separate exhaust.

¶ Upon manual initiation of the smoke removal mode, the recirculation damper is closed, the exhaust fans are stopped, and the smoke removal fan is started in conjunction with the supply fan for 100% outside air purging. In the Control Building, the recirculation damper is closed and both the exhaust fans are operated in conjunction with the supply fan for smoke removal.

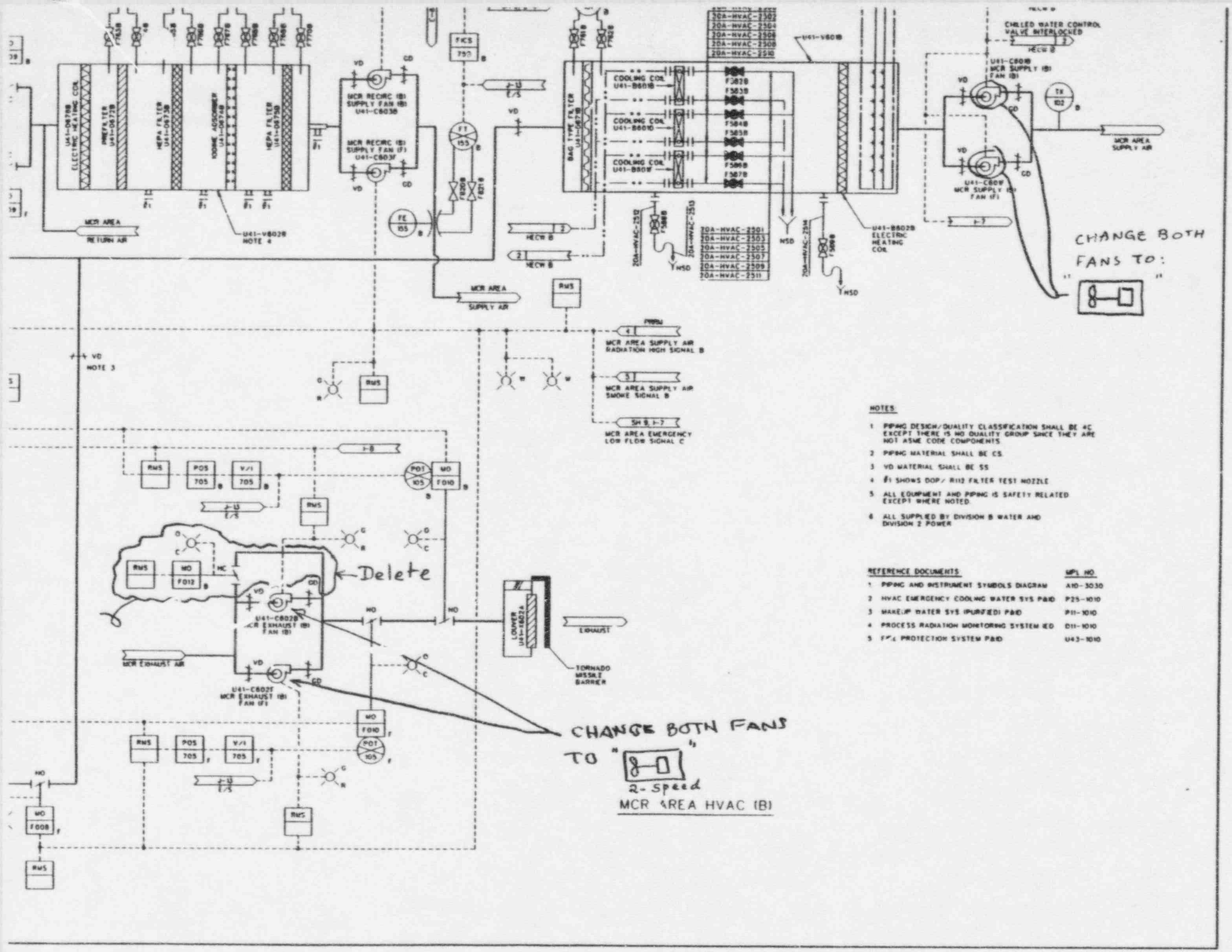
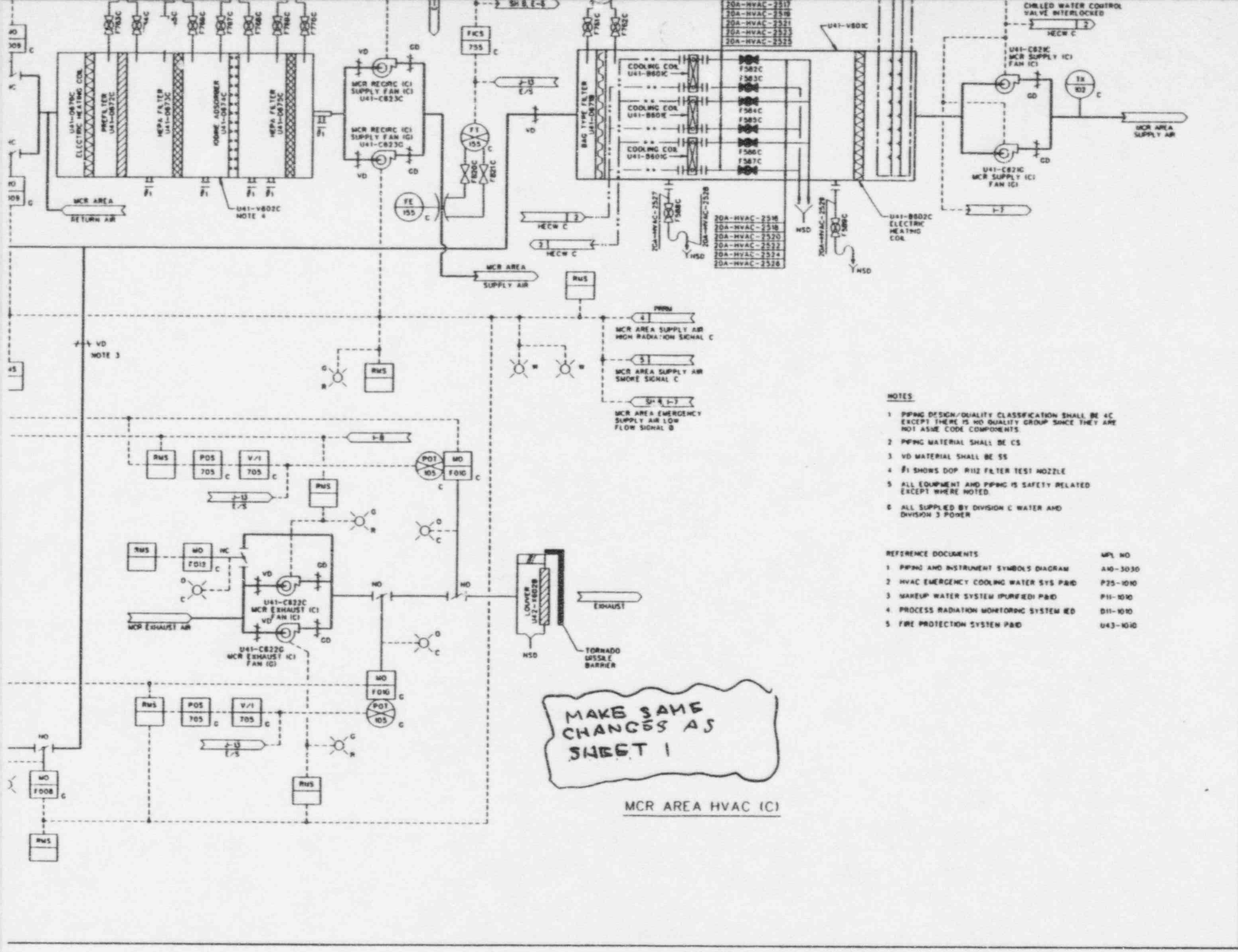


FIGURE 9.4-1 CONTROL BUILDING HVAC FLOW DIAGRAM (Sheet 1 of 5)

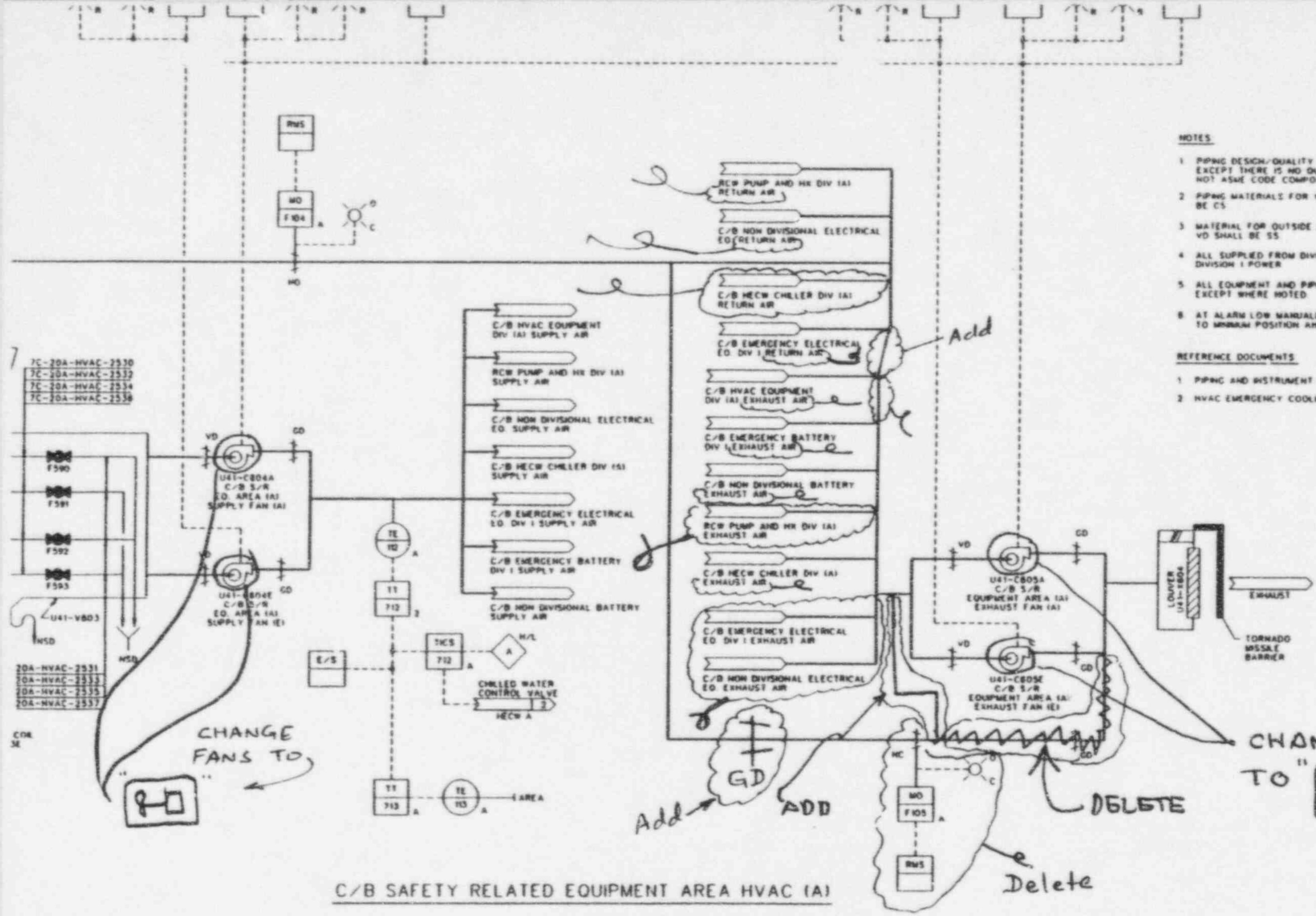


NOTES:

1. PIPING DESIGN/QUALITY CLASSIFICATION SHALL BE 4C EXCEPT THERE IS NO QUALITY GROUP SINCE THEY ARE NOT ASME CODE COMPONENTS.
2. PIPING MATERIAL SHALL BE CS
3. VD MATERIAL SHALL BE SS
4. Ø1 SHOWS DOP P112 FILTER TEST NOZZLE
5. ALL EQUIPMENT AND PIPING IS SAFETY RELATED EXCEPT WHERE NOTED.
6. ALL SUPPLIED BY DIVISION C WATER AND DIVISION 3 POWER

REFERENCE DOCUMENTS	MPL NO
1. PIPING AND INSTRUMENT SYMBOLS DIAGRAM	A10-3030
2. HVAC EMERGENCY COOLING WATER SYS P&ID	P25-1010
3. MAKEUP WATER SYSTEM (PURIFIED) P&ID	P11-1010
4. PROCESS RADIATION MONITORING SYSTEM IED	D11-1010
5. FIRE PROTECTION SYSTEM P&ID	U43-1010

FIGURE 9.4-1 CONTROL BUILDING HVAC FLOW DIAGRAM (Sheet 2 of 5)



NOTES

1 PIPING DESIGN/QUALITY CLASSIFICATION SHALL BE 4C EXCEPT THERE IS NO QUALITY GROUP SINCE THEY ARE NOT ASME CODE COMPONENTS
2 PIPING MATERIALS FOR VENT AND DRAIN SHALL BE CS
3 MATERIAL FOR OUTSIDE AIR INTAKE VD SHALL BE SS
4 ALL SUPPLIED FROM DIVISION A WATER AND DIVISION I POWER
5 ALL EQUIPMENT AND PIPING IS SAFETY RELATED EXCEPT WHERE NOTED
6 AT ALARM LOW MANUALLY ADJUST OUTDOOR AIR DAMPER TO MINIMUM POSITION AND RETURN AIR TO MAXIMUM

REFERENCE DOCUMENTS	MPL NO
1 PIPING AND INSTRUMENT SYMBOLS DIAGRAM	A10-3030
2 HVAC EMERGENCY COOLING WATER SYS P&ID	P25-1010

FIGURE 9.4-1 CONTROL BUILDING HVAC FLOW DIAGRAM (Sheet 3 of 5)

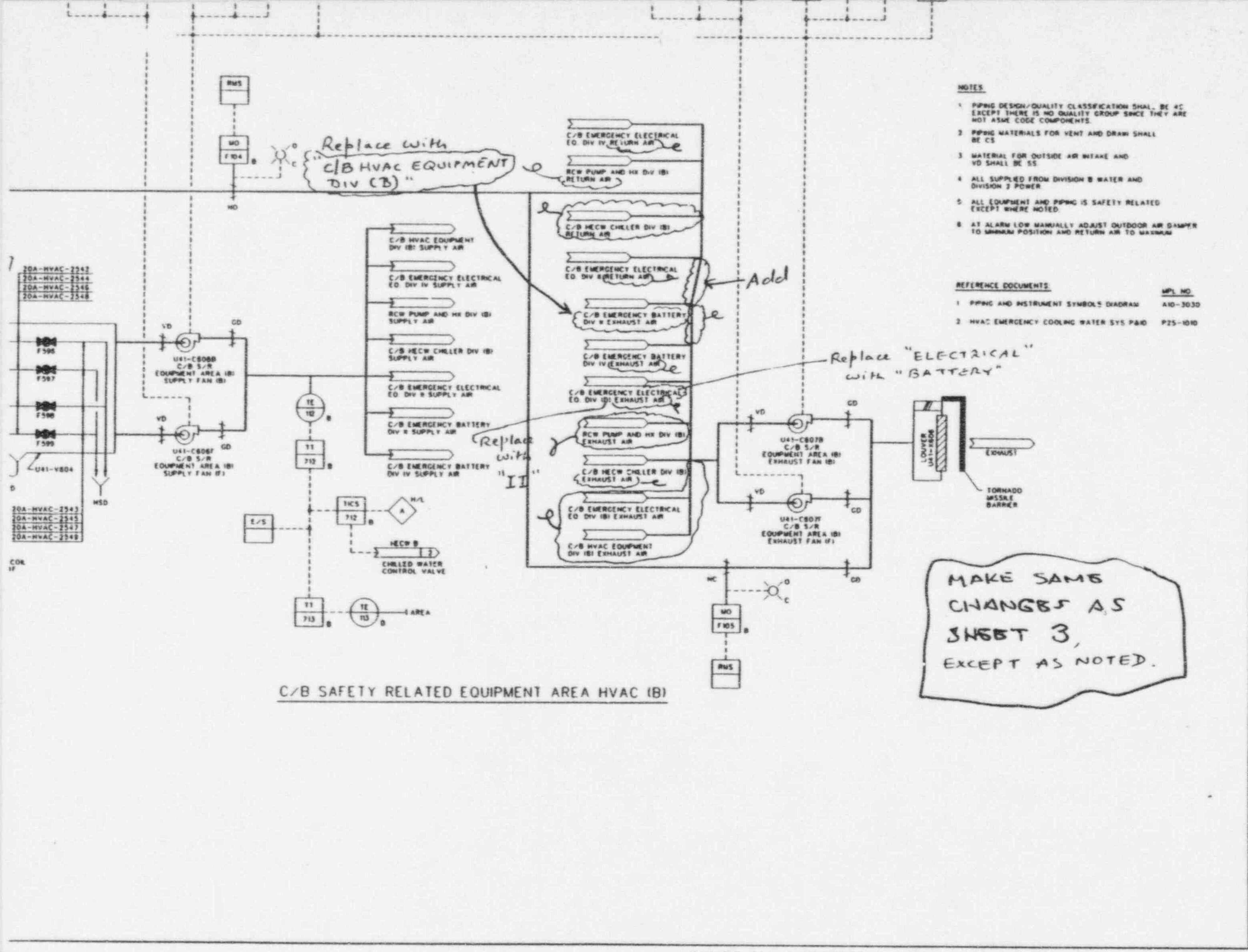
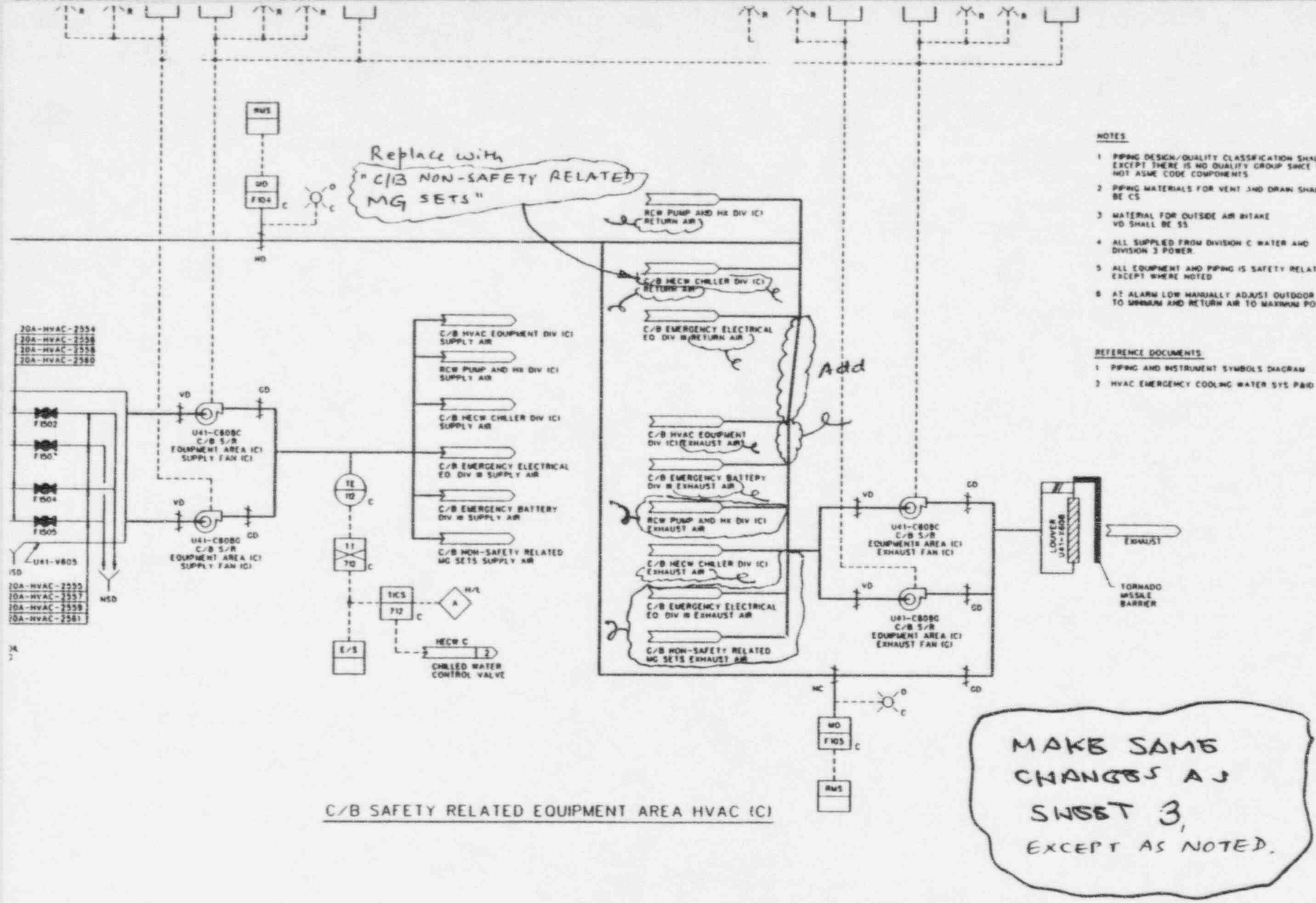


FIGURE 9.4-1 CONTROL BUILDING HVAC FLOW DIAGRAM (Sheet 4 of 5)

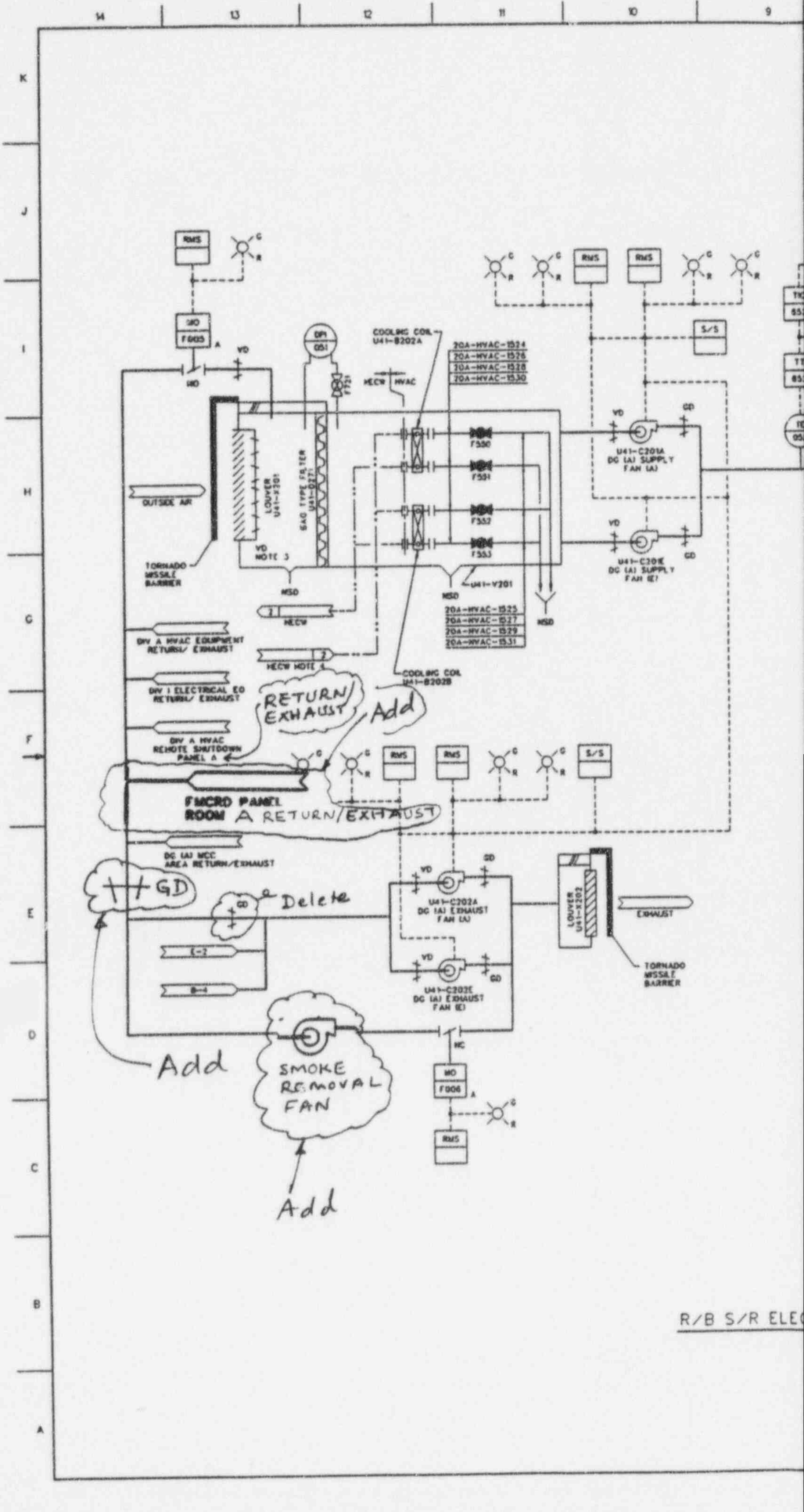


NOTES

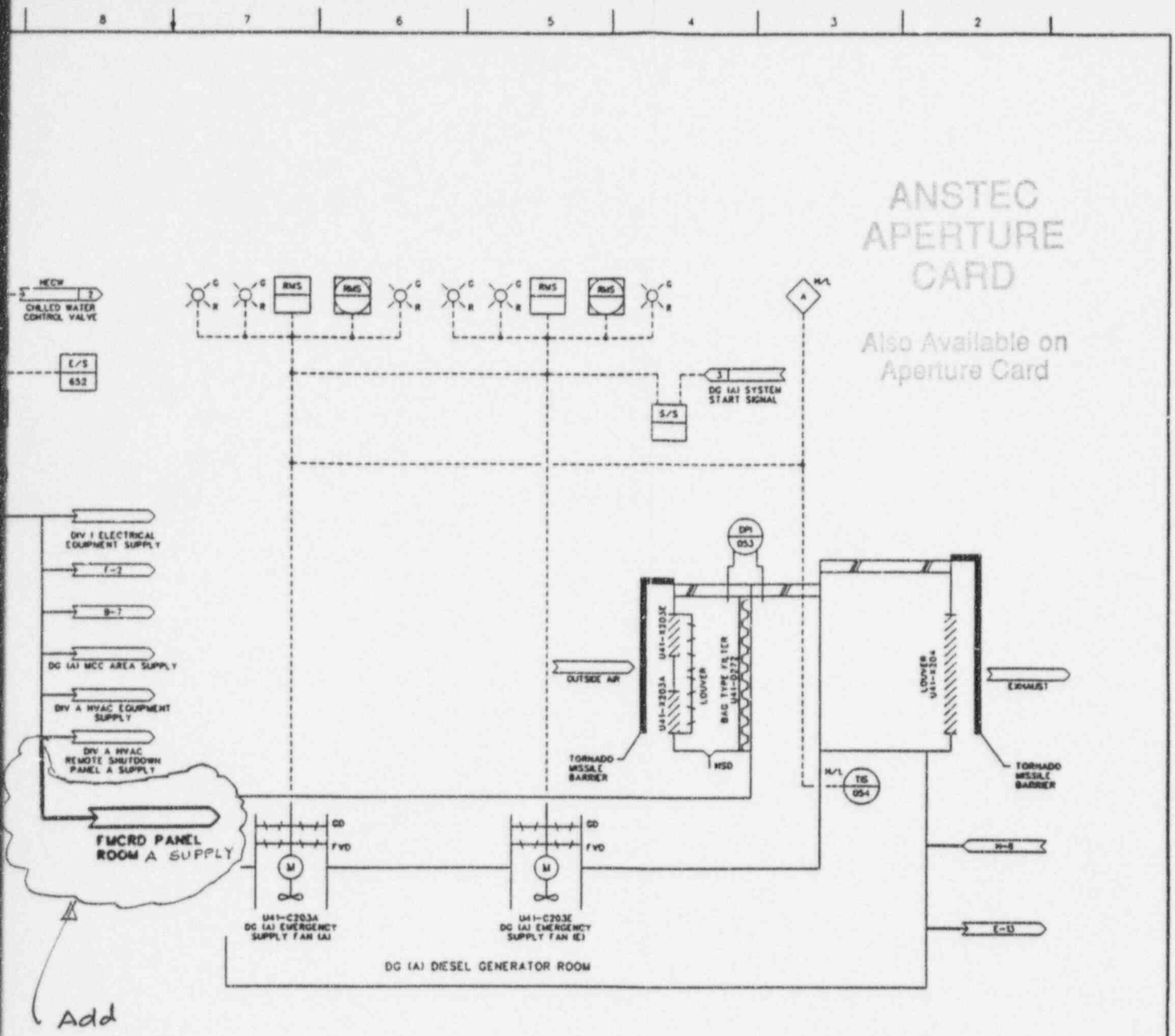
1. PIPING DESIGN/QUALITY CLASSIFICATION SHALL BE 4C EXCEPT THERE IS NO QUALITY GROUP SINCE THEY ARE NOT ASME CODE COMPONENTS
2. PIPING MATERIALS FOR VENT AND DRAIN SHALL BE CS
3. MATERIAL FOR OUTSIDE AIR INTAKE VD SHALL BE SS
4. ALL SUPPLIED FROM DIVISION C WATER AND DIVISION 3 POWER.
5. ALL EQUIPMENT AND PIPING IS SAFETY RELATED EXCEPT WHERE NOTED
6. AT ALARM LOW MANUALLY ADJUST OUTDOOR AIR DAMPER TO MINIMUM AND RETURN AIR TO MAXIMUM POSITION.

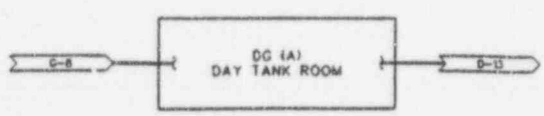
REFERENCE DOCUMENTS	MPL NO.
1 PIPING AND INSTRUMENT SYMBOLS DIAGRAM	A10-3030
2 HVAC EMERGENCY COOLING WATER SYS P&ID	P25-1010

FIGURE 9.4-1 CONTROL BUILDING HVAC FLOW DIAGRAM (Sheet 5 of 5)



RMS
MO
F005
VD
DPI
051
COOLING COIL
U41-B202A
20A-HVAC-1524
20A-HVAC-1526
20A-HVAC-1528
20A-HVAC-1530
HECW HVAC
S/S
F550
F551
F552
F553
U41-C201A
DG (A) SUPPLY FAN (A)
U41-C201E
DG (A) SUPPLY FAN (E)
OUTSIDE AIR
LOUVER U41-X201
BAG TYPE FILTER
TORNADO MISSILE BARRIER
VD NOTE 3
MSD
U41-V201
20A-HVAC-1525
20A-HVAC-1527
20A-HVAC-1529
20A-HVAC-1531
HECW
DIV A HVAC EQUIPMENT RETURN/ EXHAUST
HECW NOTE 4
COOLING COIL
U41-B202B
DIV I ELECTRICAL ED RETURN/ EXHAUST
RETURN/ EXHAUST
Add
DIV A HVAC REMOTE SHUTDOWN PANEL A
FMCRD PANEL ROOM A RETURN/EXHAUST
DG (A) MCC AREA RETURN/EXHAUST
GD
Delete
U41-C202A
DG (A) EXHAUST FAN (A)
LOUVER U41-X202
EXHAUST
TORNADO MISSILE BARRIER
E-2
B-4
U41-C202E
DG (A) EXHAUST FAN (E)
SMOKE REMOVAL FAN
NC
F006
Add
Add
R/B S/R ELEC





NOTES:

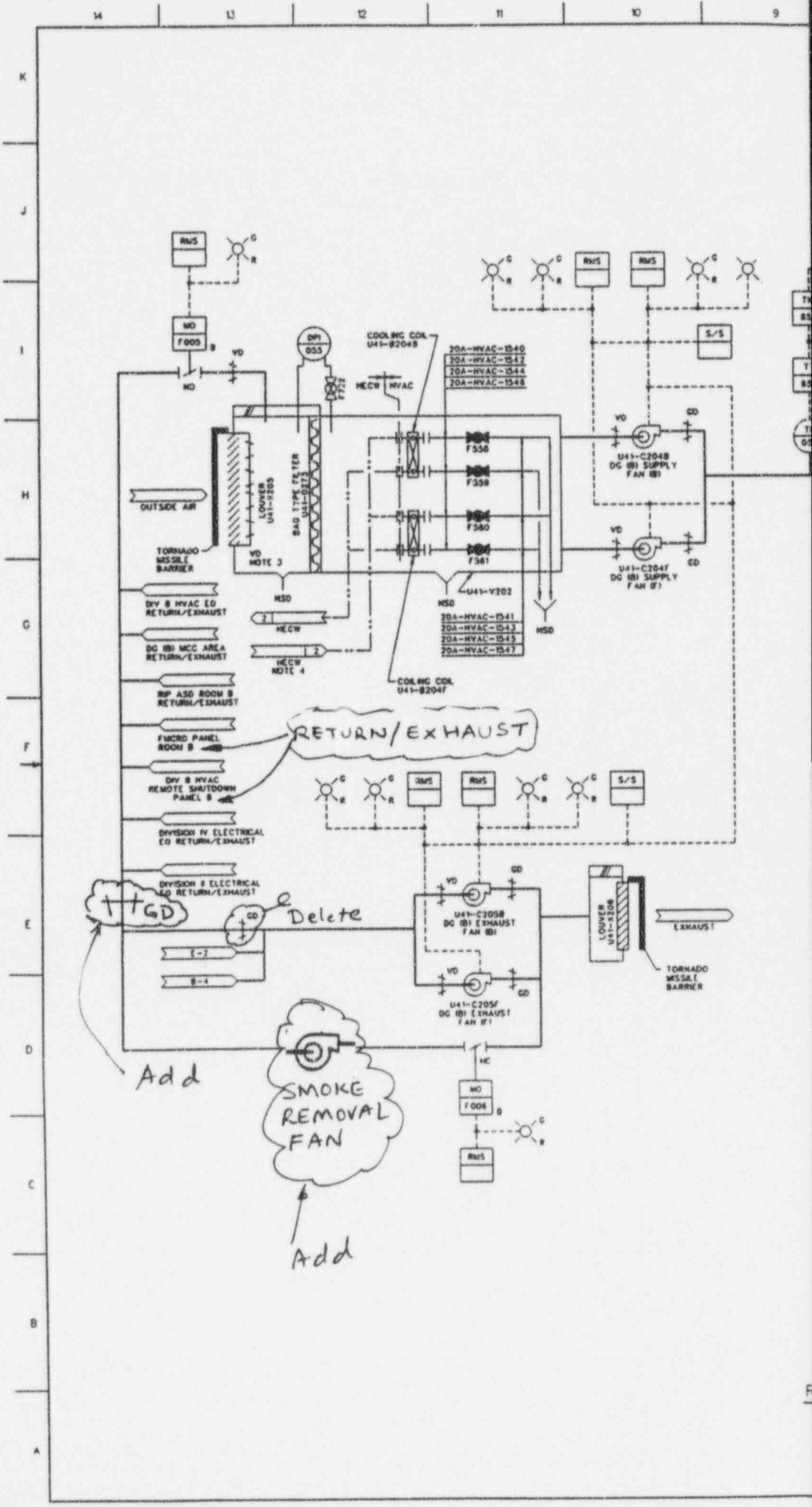
1. PIPING DESIGN/QUALITY CLASSIFICATION SHALL BE 4C EXCEPT THERE IS NO QUALITY GROUP SINCE THEY ARE NOT ASME CODE COMPONENTS.
2. PIPING MATERIALS FOR VENT AND DRAIN SHALL BE CS.
3. MATERIAL FOR OUTSIDE AIR INTAKE VD SHALL BE SS.
4. ALL SUPPLIED FROM DIVISION A WATER AND DIVISION 1 POWER.
5. ALL EQUIPMENT AND PIPING IS SAFETY RELATED EXCEPT WHERE NOTED.

REFERENCE DOCUMENTS:	MPL NO.
1. PIPING AND INSTRUMENT SYMBOLS DIAGRAM	A10-3030
2. HVAC EMERGENCY COOLING WATER SYS P&ID	P25-1010
3. DIESEL GENERATOR SYSTEM P&ID	R43-1010

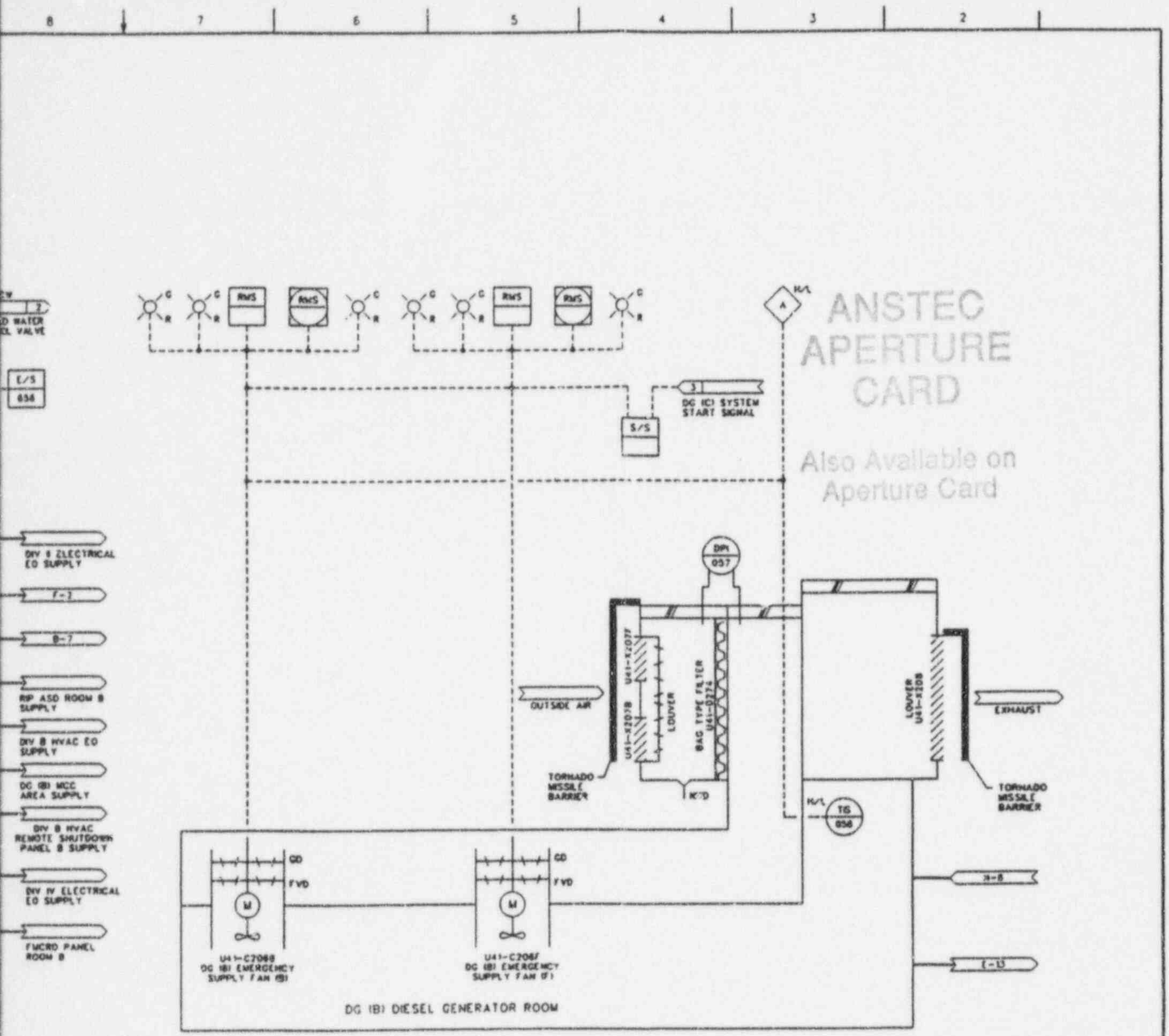
RICAL EQUIPMENT HVAC (A)

1

FIGURE 9.4-4 R/B SAFETY-RELATED ELECTRICAL EQUIPMENT HVAC SYSTEM (Sheet 1 of 3)



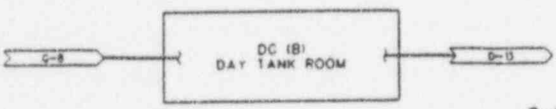
RMS
MO
F005
NO
VD
DPI
055
COOLING COIL U41-B204B
20A-HVAC-1540
20A-HVAC-1542
20A-HVAC-1544
20A-HVAC-1546
HECW
HVAC
S/S
OUTSIDE AIR
LOUVER U41-X205
BAG TYPE FILTER
TORNADO MISSILE BARRIER
VD NOTE 3
F356
F358
F360
F361
U41-C204B DG (B) SUPPLY FAN (B)
U41-C204F DG (B) SUPPLY FAN (F)
GD
MSD
U41-V202
20A-HVAC-1541
20A-HVAC-1543
20A-HVAC-1545
20A-HVAC-1547
DIV B HVAC EQ RETURN/EXHAUST
DG (B) MCC AREA RETURN/EXHAUST
HECW NOTE 4
COOLING COIL U41-B204F
RIP ASD ROOM B RETURN/EXHAUST
FMCRD PANEL ROOM B
RETURN/EXHAUST
DIV B HVAC REMOTE SHUTDOWN PANEL B
DIVISION IV ELECTRICAL EQ RETURN/EXHAUST
DIVISION II ELECTRICAL EQ RETURN/EXHAUST
GD
Delete
U41-C205B DG (B) EXHAUST FAN (B)
U41-C205F DG (B) EXHAUST FAN (F)
LOUVER U41-X206
EXHAUST
TORNADO MISSILE BARRIER
E-2
B-4
Add
SMOKE REMOVAL FAN
NC
MO
F006
Add



NOTES

1. PIPING DESIGN/QUALITY CLASSIFICATION SHALL BE 4C EXCEPT THERE IS NO QUALITY GROUP SINCE THEY ARE NOT ASME CODE COMPONENTS.
2. PIPING MATERIALS FOR VENT AND DRAIN SHALL BE CS
3. MATERIAL FOR OUTSIDE AIR INTAKE VD SHALL BE SS
4. ALL SUPPLIED FROM DIVISION B WATER AND DIVISION 2 POWER
5. ALL EQUIPMENT AND PIPING IS SAFETY RELATED EXCEPT WHERE NOTED

REFERENCE DOCUMENTS	MPL NO
1 PIPING AND INSTRUMENT SYMBOLS DIAGRAM	A10-3030
2 HVAC EMERGENCY COOLING WATER SYS P&ID	P25-1010
3 DIESEL GENERATOR SYSTEM P&ID	R43-1010



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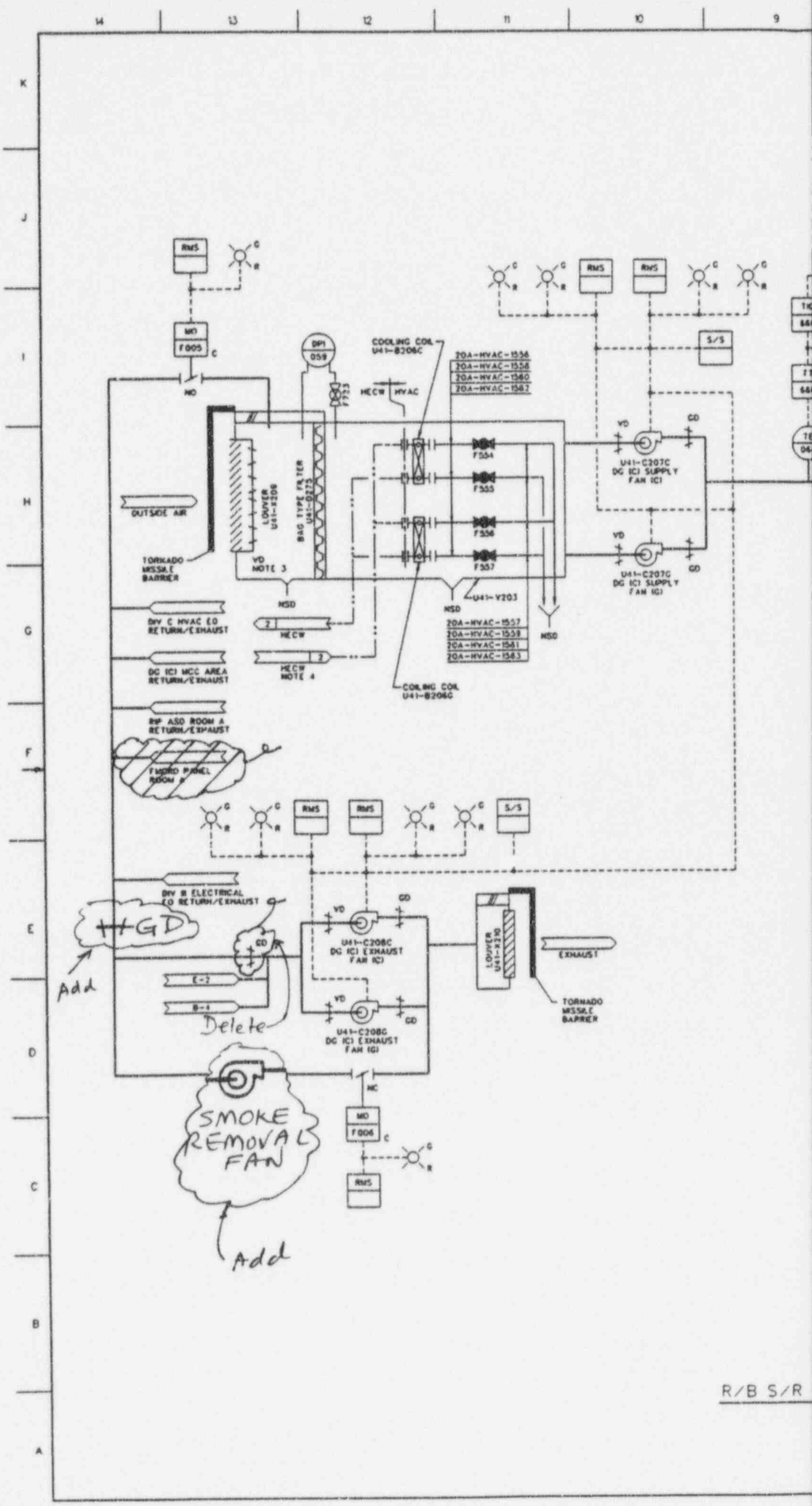
R ELECTRICAL EQUIPMENT HVAC (B)

1

FIGURE 9.4-4 R/B SAFETY-RELATED ELECTRICAL EQUIPMENT HVAC SYSTEM (Sheet 2 of 3)



RMS
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DPI
059
F723
HECW
HVAC
COOLING COIL
U41-B206C
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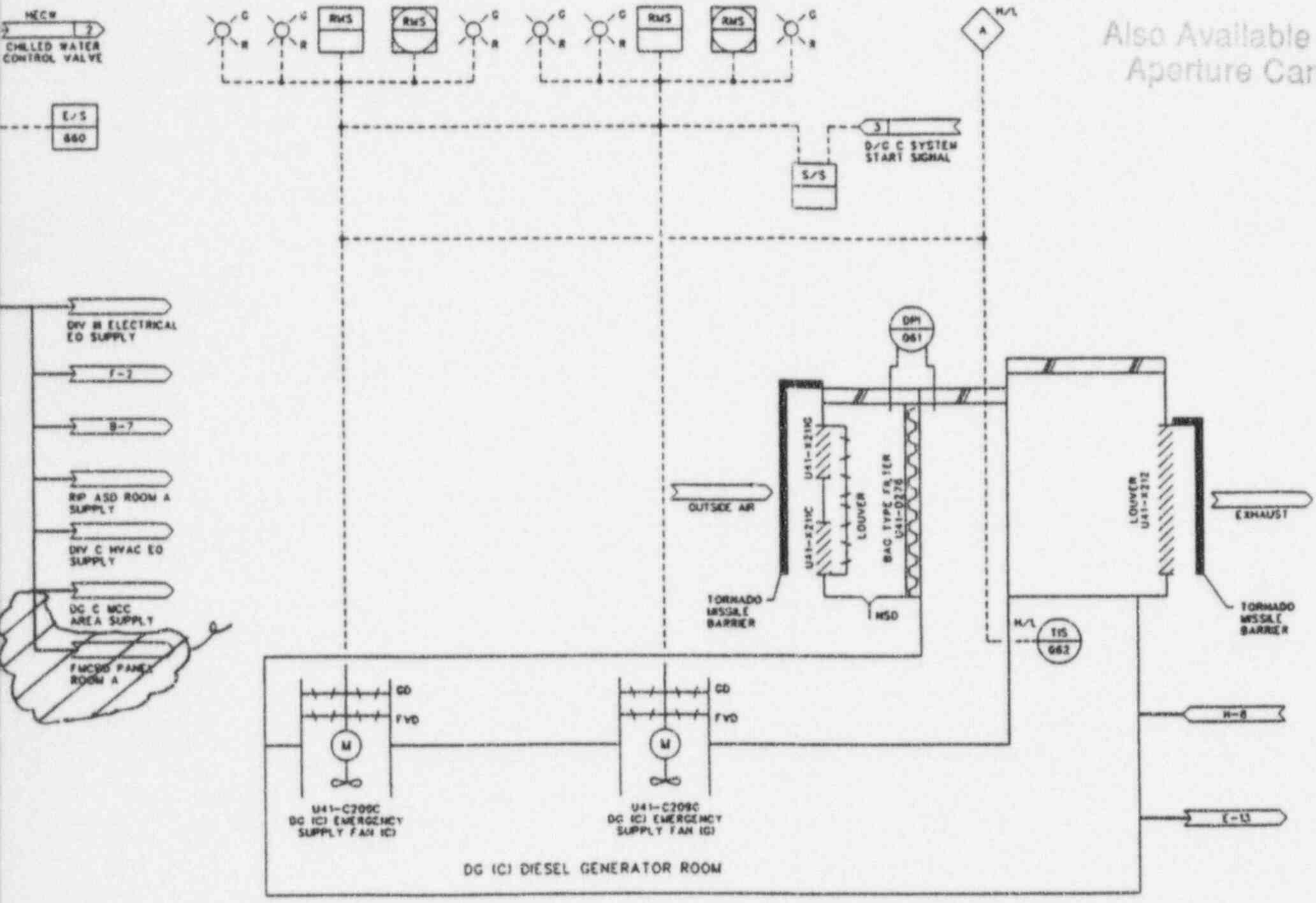
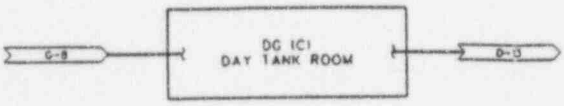
20A-HVAC-1558
20A-HVAC-1560
20A-HVAC-1587
S/S
VD
GD
F554
F555
F556
F557
U41-C207C
DG (C) SUPPLY
FAN (C)
U41-C207G
DG (C) SUPPLY
FAN (G)
OUTSIDE AIR
LOUVER
U41-X209
BAG TYPE FILTER
U41-D275
TORNADO
MISSILE
BARRIER
VD
NOTE 3
NSD
U41-Y203
20A-HVAC-1557
20A-HVAC-1559
20A-HVAC-1561
20A-HVAC-1563
DIV C HVAC ED
RETURN/EXHAUST
DC (C) MCC AREA
RETURN/EXHAUST
HECW
HECW
NOTE 4
COILING COIL
U41-B206C
RHP ASD ROOM A
RETURN/EXHAUST
DIV B ELECTRICAL
ED RETURN/EXHAUST
GD
Add
E-2
B-4
Delete
U41-C208C
DG (C) EXHAUST
FAN (C)
U41-C208G
DG (C) EXHAUST
FAN (G)
LOUVER
U41-X210
EXHAUST
TORNADO
MISSILE
BARRIER
NC
MO
F006
SMOKE
REMOVAL
FAN
Add
R/B S/R



NOTES:

1. PIPING DESIGN/QUALITY CLASSIFICATION SHALL BE 4C EXCEPT THERE IS NO QUALITY GROUP SINCE THEY ARE NOT ASME CODE COMPONENTS.
2. PIPING MATERIALS FOR VENT AND DRAIN SHALL BE CS.
3. MATERIAL FOR OUTSIDE AIR INTAKE VD SHALL BE SS.
4. ALL SUPPLIED FROM DIVISION C WATER AND DIVISION 3 POWER.
5. ALL EQUIPMENT AND PIPING IS SAFETY RELATED EXCEPT WHERE NOTED.

REFERENCE DOCUMENTS	MPL NO.
1. PIPING AND INSTRUMENT SYMBOLS DIAGRAM	A10-3030
2. HVAC EMERGENCY COOLING WATER SYS P&ID	P25-1010
3. DIESEL GENERATOR SYSTEM P&ID	R43-1010



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ECTRICAL EQUIPMENT HVAC (C)

FIGURE 9.4-4 R/B SAFETY-RELATED ELECTRICAL EQUIPMENT HVAC SYSTEM (Sheet 3 of 3)

PROPOSED CHANGES

CHANGE PACKAGE NO. 4

Reassign MCR Exhaust Fan Designations

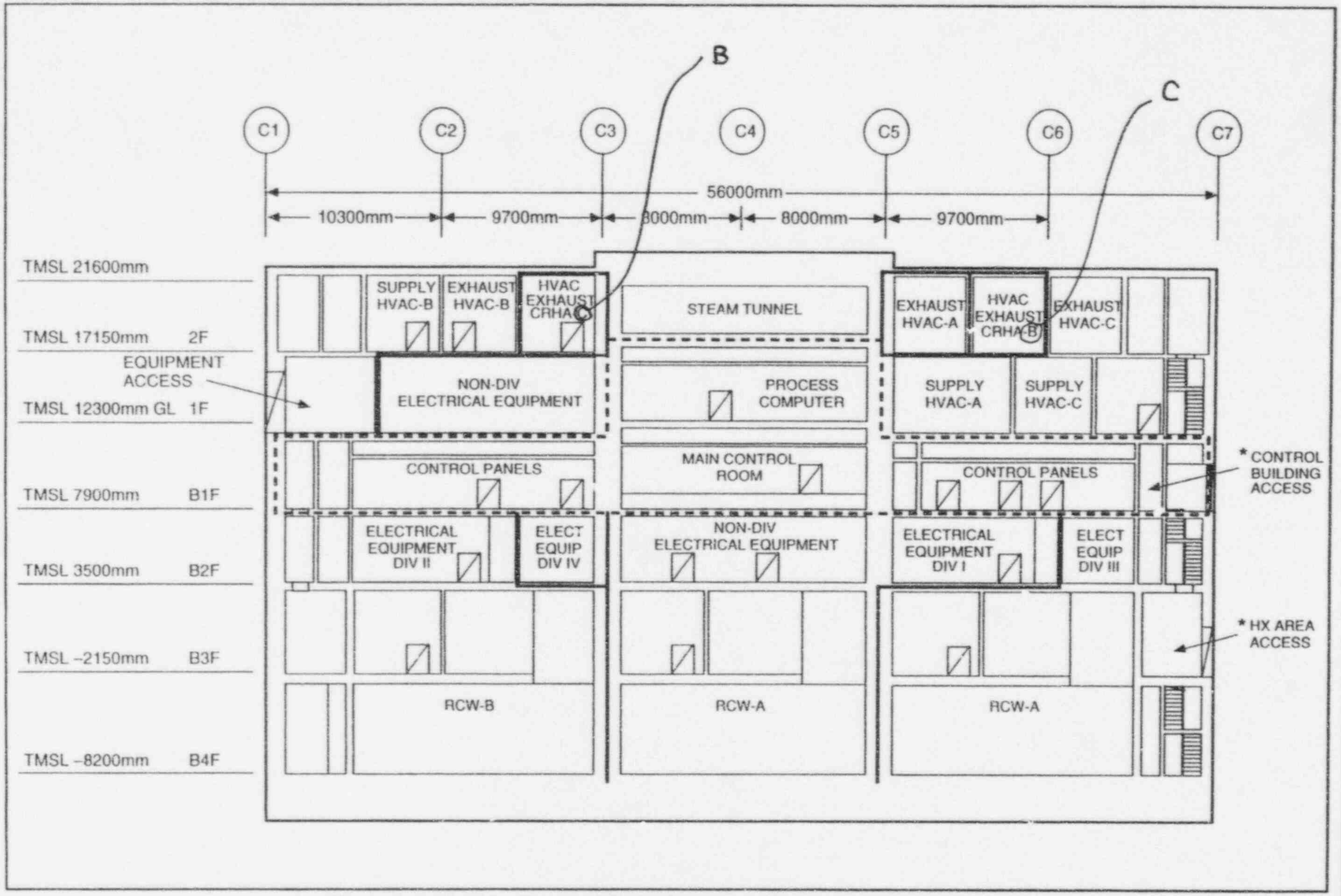


Figure 2.15.12b Control Building Arrangement, Section B-B

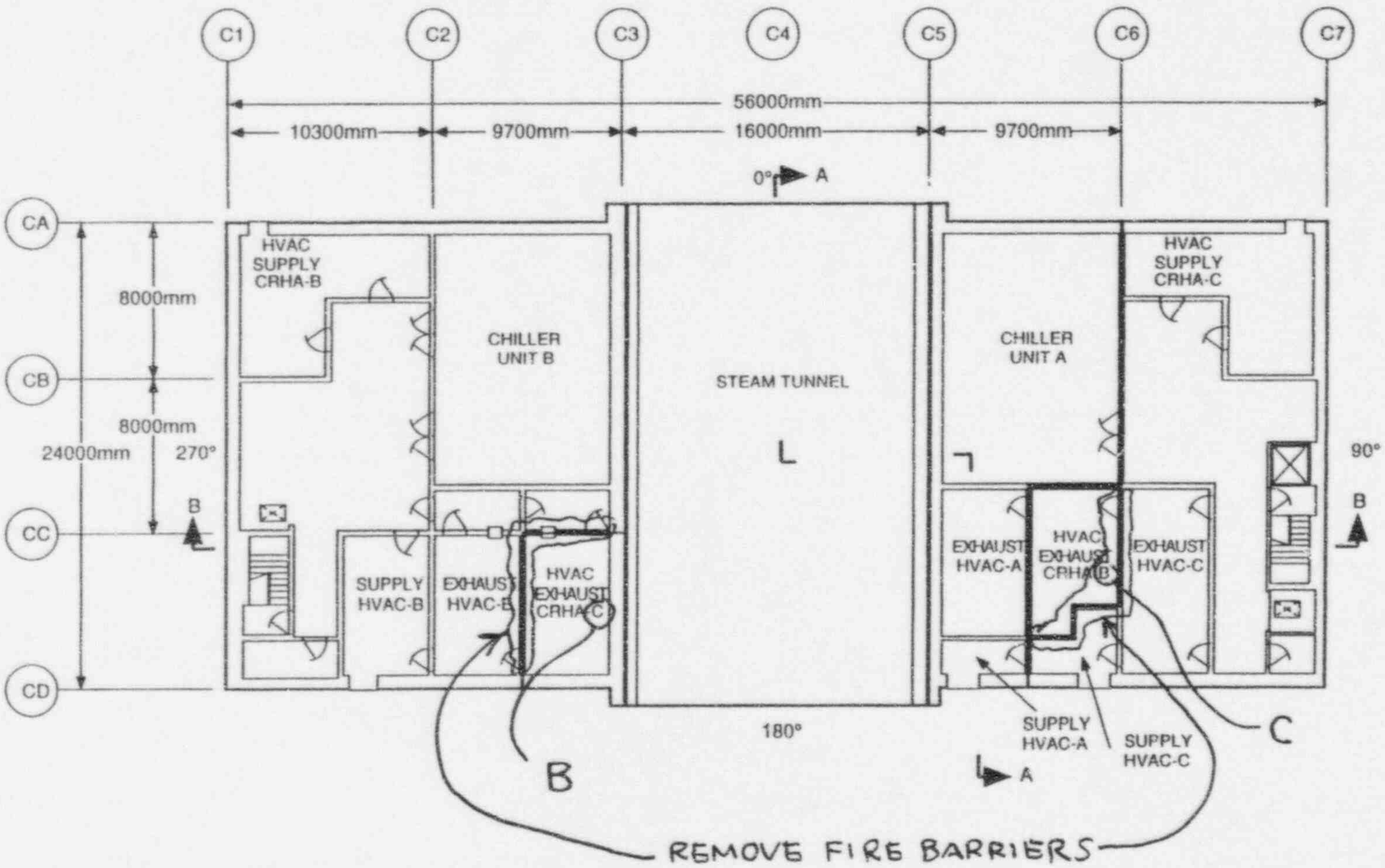


Figure 2.15.12h Control Building Arrangement, Floor 2F—Elevation 17150 mm

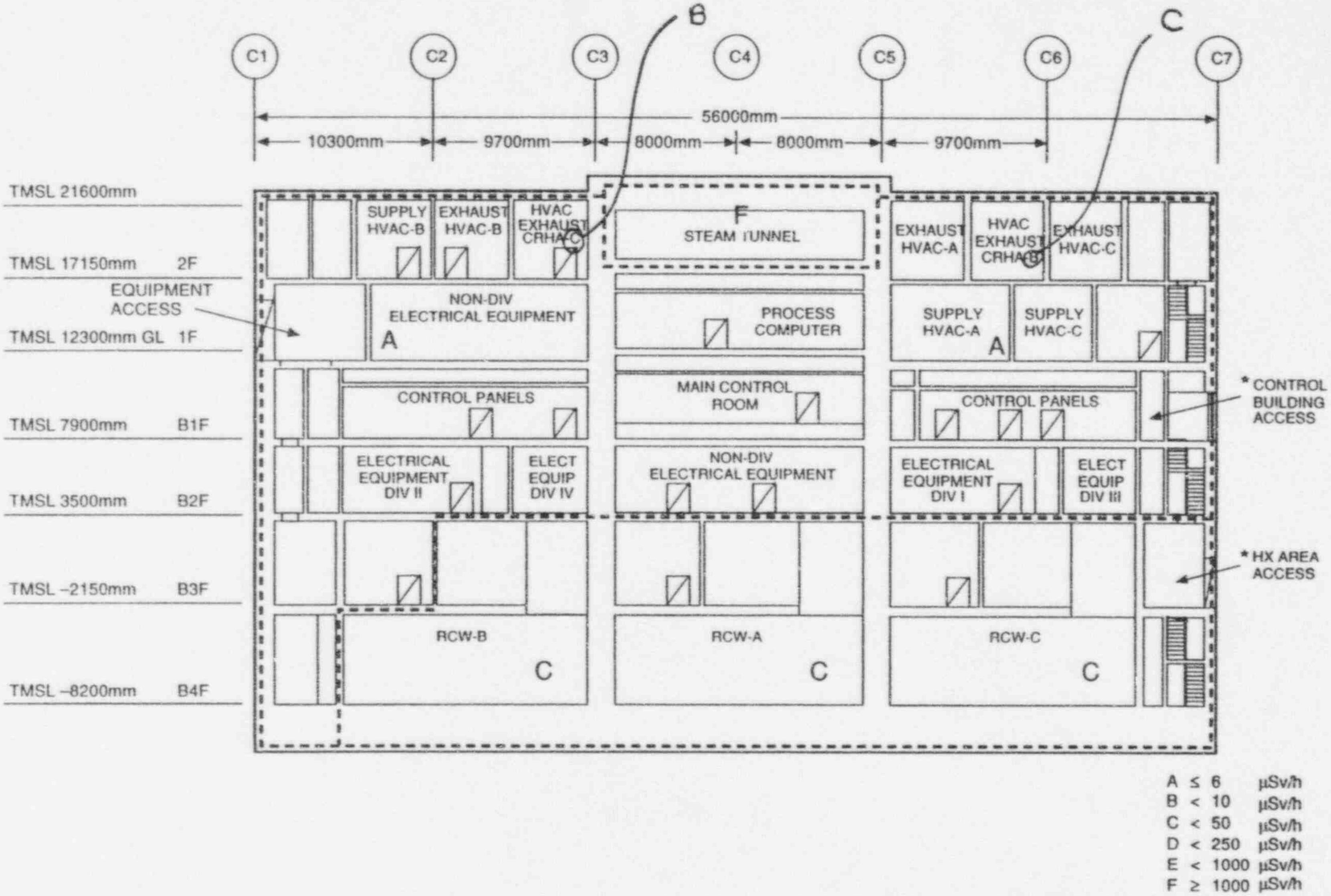


Figure 3.2p Control Building Radiation Zone Map for Full Power Operations, Section B-B

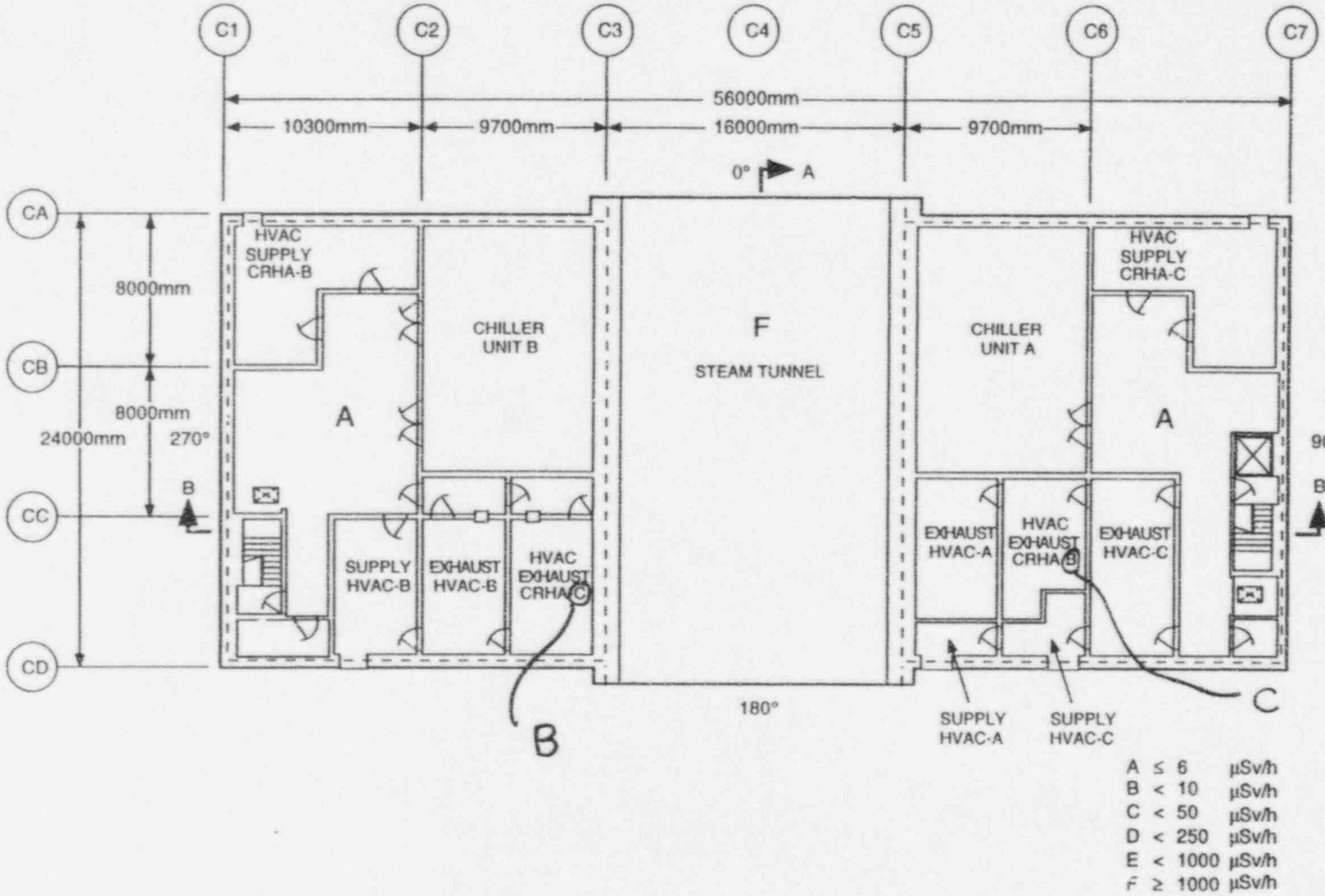


Figure 3.2v Control Building Radiation Zone Map for Full Power Operation, Floor 2F—Elevation 17150 mm

conduit in the raised floor areas. Cable contained in conduit or enclosed trays are not considered to contribute to the combustible loading for the room.

The divisional panels are physically separated as much as practical and located above the divisional electrical equipment rooms. The cabling from the divisional electrical equipment rooms will be routed to the Safety System Logic Control (SSLC) cabinets with Divisions I and III on one side of the operator area and Divisions II and IV located on the opposite side of the operator area.

There is a suspended ceiling but only cables associated with lighting and the fire alarm system are routed above the false ceiling. The cables are in conduit.

Paper within the control room complex is required to be stored in approved containers (file cabinets, cabinets, waste baskets) except when in use.

9A.4.2.5 Floor Five El 12300 mm

9A.4.2.5.1 Control Room HVAC ~~"C"~~ B Exhaust Duct Chase (Rm No. 522)

(1) Fire Area—FC~~4310~~ 4220

(2) Equipment: See Table 9A.6-3

Safety-Related	Provides Core Cooling
Yes, D3	No

(3) Radioactive Material Present—None.

(4) Qualification of Fire Barriers—Rm No. 522 is defined as a vertical section of HVAC chase extending from the ceiling of the control room, formed by the floor located at the 12300 mm elevation, to the floor of Rm No. 629 located at the 17150 mm elevation. All four walls are designated as fire barriers and are of three hour fire-resistive concrete construction. Access to Rm No. 522 from the 12300 mm level is provided by a three hour, fire-resistive removable panel.

(5) Combustibles Present—(NCLL Applies)

Type	Fire Loading Total Heat of Combustion (MJ)
Cable in trays	727 MJ/m^2 NCLL (727 MJ/m^2 maximum average) applies

(6) Detection Provided—Class A Supervised POC detection system in the room and manual pull alarm station at 1.62-J.60.

(7) Suppression Available:

Type	Location/Actuation
Standpipe and hose reel	4.00-K.95 & 1.6 - J.5/Manual
ABC hand extinguishers	4.0 - K.95 & 1.6 - J.5/Manual

(8) Fire Protection Design Criteria Employed:

(a) The function is located in a fire area which is separate from fire areas providing alternate means of performing the safety or shutdown function.

(b) Fire detection and suppression capability is provided and accessible.

(c) Fire stops are provided for cable tray and piping penetrations through designated barriers.

(9) Consequences of Fire—Postulated fire assumes loss of the function. Alternate means is provided by control room HVAC "~~B~~". C

Smoke control is by the normal HVAC System functioning in the smoke control mode. Refer to 9.5.1.1.6 for additional information.

(10) Consequences of Fire Suppression—Suppression extinguishes the fire. Refer to Section 3.4, "Water Level (Flood) Design," for the drain system.

(11) Design Criteria Used for Protection Against Inadvertent Operation, Careless Operation or Rupture of the Suppression System:

(a) Refer to Section 3.4, "Water Level (Flood) Design," for the drain system.

(b) Location of the manual suppression system in an area external to the room containing the safety-related equipment

(12) Fire Containment or Inhibiting Methods Employed:

(a) The functions are located in a separate fire-resistive enclosure.

(b) The means of fire detection, suppression and alarming are provided and accessible.

9A.4.2.5.12 Control Room HVAC "~~B~~ C," Exhaust Duct Chase (Rm No. 595)

(1) Fire Area—FC~~4220~~ 4310

(2) Equipment: See Table 9A.6-~~4~~ 3

Safety-Related	Provides Core Cooling
Yes, 2	No, See Remarks.

(3) Radioactive Material Present—None.

(4) Qualification of Fire Barriers—Rm No. 595 is defined as a vertical section of HVAC chase extending from the ceiling of the control room, formed by the floor at the 12300 mm elevation, to the 17150 mm elevation. Walls common to Rm No. 512 (FC1110), Rm No. 532 (FC1310) Rm No. 593 (FC1310) and Rm No. 506 (FC5110) are designated fire barriers and are of three hour fire-resistive concrete construction. Access to Rm No. 595 is provided by a removable panel.

(5) Combustibles Present—(NCLL Applies)

Type	Fire Loading Total Heat of Combustion (MJ)
None	727 MJ/m^2 NCLL (727 MJ/m^2 maximum average) applies

(6) Detection Provided—Class A Supervised POC detection system in the room and manual pull alarm station at 6.50-J.75.

(7) Suppression Available:

Type	Location/Actuation
Standpipe and hose reel	4.0 - J.1 & 6.60-J.67 on the 17150 level/Manual
ABC hand extinguishers	4.0 - J.1 & 6.60 - J.67/ Manual

(8) Fire Protection Design Criteria Employed:

(a) The function is located in a fire-resistive enclosure.

(b) Fire detection and suppression capability is provided and accessible.

(9) Consequences of Fire—Postulated fire assumes loss of the function. alternate means is provided by control room HVAC "C". B

Smoke control is by the normal HVAC System functioning in the smoke control mode. Refer to 9.5.1.1.6 for additional information.

(10) Consequences of Fire Suppression—Suppression extinguishes the fire. Refer to Section 3.4, "Water Level (Flood) Design," for the drain system.

(11) Design Criteria Used for Protection Against Inadvertent Operation, Careless Operation or Rupture of the Suppression System.

(a) Location of the manual suppression system in an area external to the room containing the safety-related equipment

(b) ANSI B31.1 standpipe (rupture unlikely)

(12) Fire Containment or Inhibiting Methods Employed:

(a) The functions are located in a separate fire-resistive enclosure.

(b) The means of fire detection, suppression and alarming are provided and accessible.

(c) Fire stops are provided for cable tray and piping penetrations through rated fire barriers.

(13) Remarks—Quantities of cable may be so small that they will be in conduit rather than cable tray.

9A.4.2.5.13 Passageway (Rm No. 506)

(1) Fire Area—FC5110

(2) Equipment: See Table 9A.6-3

Safety-Related	Provides Core Cooling
No	No

(3) Radioactive Material Present—None.

(4) Qualification of Fire Barriers—All walls of this passageway are designated fire barriers and are of three hour fire-resistive concrete construction. The ceiling is common to fire areas FC4310, FC1210, FC1110, FC1310, FC4220 and the steam tunnel above and is of three hour fire-resistive concrete construction. The floor is common to fire area FC4910 below and is also of three hour fire-

(10) Consequences of Fire Suppression—Suppression extinguishes the fire. Refer to Section 3.4, "Water Level (Flood) Design," for the drain system.

(11) Design Criteria Used for Protection Against Inadvertent Operation, Careless Operation or Rupture of the Suppression System:

- (a) Refer to Section 3.4, "Water Level (Flood) Design," for the drain system.
- (b) Provision of raised supports for the equipment
- (c) Location of manual suppression system in an area external to the room containing the safety-related equipment
- (d) ANSI B31.1 standpipe (rupture unlikely)

(12) Fire Containment or Inhibiting Methods Employed:

- (a) The functions are located in a separate fire-resistive enclosure.
- (b) The means of detection, suppression and alarming are provided and accessible.
- (c) Fire stops are provided for cable tray and piping penetrations through rated-fire barriers.

(13) Remarks—This equipment is also required to function to support equipment required for remote shutdown and therefore is in a fire area separate from the control room and its HVAC equipment.

The exhaust fans do not provide any cooling function. They only serve a purge function which is not necessary to the cooling function of the HVAC System.

9A.4.2.6.6 Control Room HVAC Exhaust "C" (Rm Nos. 626, 628, 629 and 663)

(1) Fire Area—FC4310 4220

(2) Equipment: See Table 9A.6-3

Safety-Related	Provides Core Cooling
Yes, D3	No

(3) Radioactive Material Present—None.

(4) Qualification of Fire Barriers—The building exterior wall common to Rm No. 663 and the steam tunnel wall also common to Rm Nos. 620, 626, 628 and 663 is a fire barrier of three hour fire-resistive concrete construction. The two interior walls common to adjacent fire area FC1210 are of three hour fire-

~~resistive concrete construction~~. The common interior walls between Rm Nos. ~~620, 626, 628-629~~ and 663 are in the same fire area and are not fire barriers. The ceiling of this fire area forms a building exterior boundary and is of three hour fire-resistive concrete construction. The exhaust duct through the ceiling in Rm No. ~~628~~ does not have a fire damper. See Subsection 9.5.1.1.6 for a discussion of this design feature. A section of the floor common to fire area FC1210 and FC5010 below, is also of three hour fire-resistive concrete construction. Access to the CR HVAC Exhaust area is provided from Rm No. 622 through Rm No. ~~661~~. ~~Access to Rm No. 663 is via Rm Nos. 664 and 624 from Rm No. 662. Access to Rm Nos. 620, 626 and 629 is via removable panels.~~

(5) Combustibles Present—(NCLL Applies)

Type	Fire Loading Total Heat of Combustion (MJ)
Cable in trays	727 MJ/m^2 NCLL (727 MJ/m^2 maximum average) applies

(6) Detection Provided—Class A Supervised POC detection system in the fire area and manual pull alarm station at 1.42-J.67.

(7) Suppression Available:

Type	Location/Actuation
Standpipe and hose reel	1.37-J.67/Manual
ABC hand extinguishers	1.42-J.67 and 1.30-K.55/Manual

(8) Fire Protection Design Criteria Employed:

(a) The function is located in a fire area which is separate from fire areas providing alternate means of performing the safety or shutdown function.

(b) Fire detection and suppression capability is provided and accessible.

(c) Fire stops are provided for cable tray and piping penetrations through designated fire barriers.

(9) Consequences of Fire—Postulated fire assumes loss of the function, but continued operation of the exhaust fans are not required for the equipment and systems served. If the CR HVAC "B" or "C" are placed in the smoke removal mode the control room should remain habitable.

(9) Consequences of Fire—Postulated fire assumes loss of function. Even though access to rooms 612, 636, 631, 634 and 651 are not possible, the equipment in these rooms are functional (they are in a different fire area). Alternate means is provided by CRHVAC "B".

(10) Consequences of Fire Suppression—Suppression extinguishes the fire. Refer to Section 3.4, "Water Level (Flood) Design," for the drain system.

(11) Design Criteria Used for Protection Against Inadvertent Operation, Careless Operation or Rupture of the Suppression System:

- (a) Refer to Section 3.4, "Water Level (Flood) Design," for the drain system.
- (b) ANSI B31.1 standpipe (rupture unlikely)

(12) Fire Containment or Inhibiting Methods Employed:

- (a) The functions are located in a fire-resistive enclosure.
- (b) The means of detection, suppression and alarming are provided and accessible.
- (c) Fire stops are provided for cable tray and piping penetrations through rated fire barriers.

(13) Remarks—safety-related cooling for multiple divisions is provided by redundant systems. The equipment on level 17150 in this fire area provides one division of cooling for the multi-divisional control room.

9A.4.2.6.10 Control Room HVAC Exhaust "~~B~~ C" (Rm Nos. 614) ~~616 and 654)~~

(1) Fire Area—FC~~4220~~ 4316

(2) Equipment: See Table 9A.6-3

Safety-Related	Provides Core Cooling
Yes, D2	No, See Remarks.

(3) Radioactive Material Present—None.

(4) Qualification of Fire Barriers—All walls in this area are interior walls. The walls common to fire area~~s~~ FC1110 ~~and FC1310 and~~ are designated as fire barriers and are of three hour fire-resistive concrete construction. The remaining interior walls are not fire barriers. The ceiling is a building exterior wall and is also of three hour fire-resistive concrete construction. The floor is common to

adjacent fire area FC1310 below, is of three hour fire-resistive concrete construction. Access to the CR HVAC "C" exhaust area is provided from Rm No. ~~653.~~ 631.

(5) Combustibles Present—(NCLL Applies)

Type	Fire Loading Total Heat of Combustion (MJ)
Cable in trays	727 MJ/m^2 NCLL (727 MJ/m^2 maximum average) applies

(6) Detection Provided—Class A Supervised POC detection system in the fire area and manual pull alarm station at 6.70-J.67.

(7) Suppression Available:

Type	Location/Actuation
Standpipe and hose reel	6.60-J.67/Manual
ABC hand extinguishers	6.60-J.67 and 6.70-K.55/Manual

(8) Fire Protection Design Criteria Employed:

(a) The function is located in a fire area which is separate from fire areas providing alternate means of performing the safety or shutdown function.

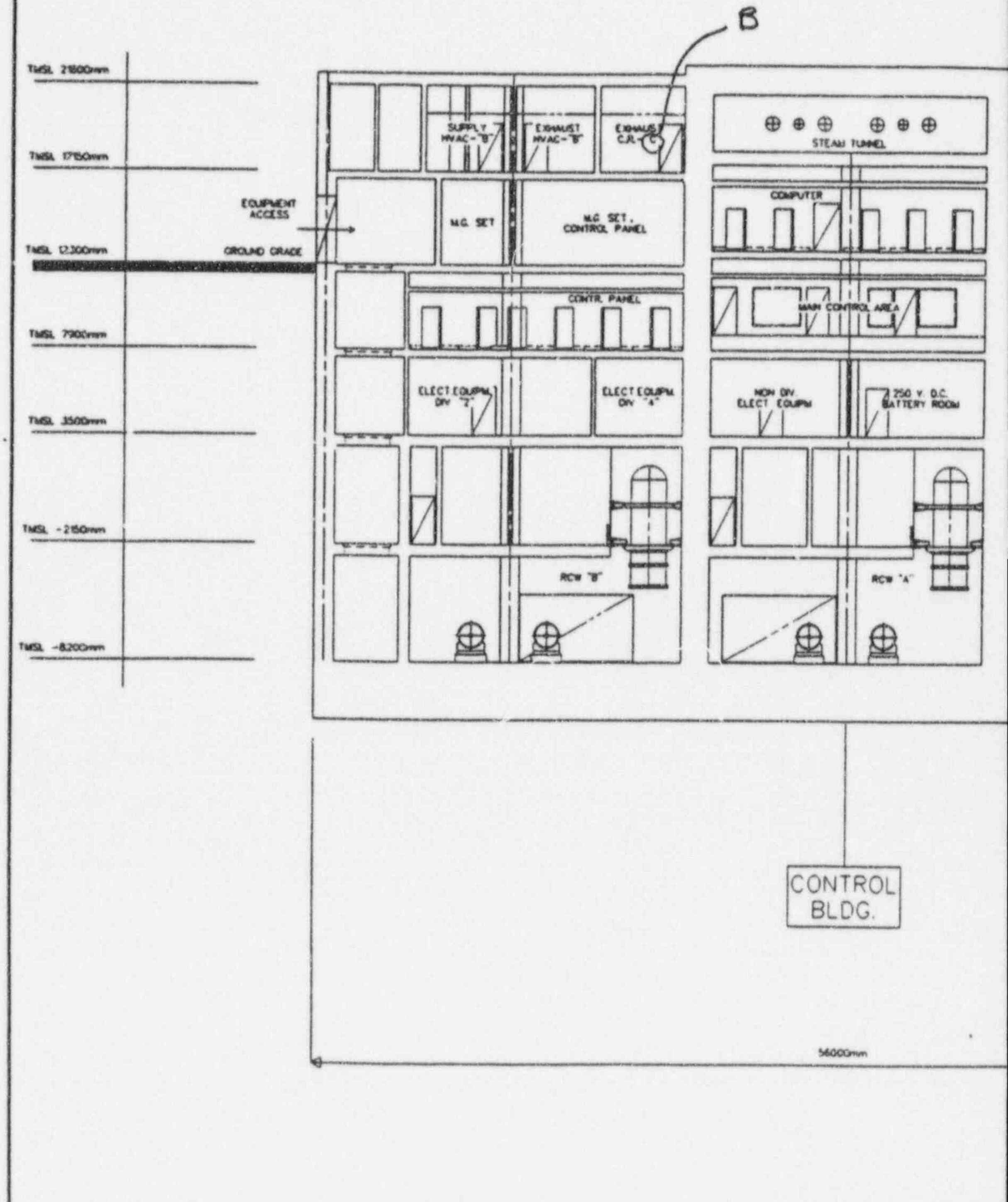
(b) Fire detection and suppression capability is provided and accessible.

(c) Fire stops are provided for cable tray and piping penetrations through designated fire barriers.

(9) Consequences of Fire—Postulated fire assumes loss of the function, but continued operation of the exhaust fans is not required for the equipment and systems served. If the control room HVAC is manually switched to the smoke removal mode the control room should remain habitable.

Smoke control is by the normal HVAC System functioning in the smoke control mode. Refer to 9.5.1.1.6 for additional information.

(10) Consequences of Fire Suppression—Suppression extinguishes the fire. Refer to Section 3.4, "Water Level (Flood) Design," for the drain system.



TMSL 21800mm
TMSL 17150mm
TMSL 12300mm
TMSL 7900mm
TMSL 3500mm
TMSL -2150mm
TMSL -8200mm
B
SUPPLY HVAC-"B"
EXHAUST HVAC-"B"
EXHAUST C.R.
STEAM TUNNEL
EQUIPMENT ACCESS
GROUND GRADE
M.G. SET
M.G SET, CONTROL PANEL
COMPUTER
CONTR. PANEL
MAIN CONTROL AREA
ELECT EQUPM DIV "2"
ELECT EQUPM DIV "4"
NON DIV ELECT EQUPM
250 V. DC. BATTERY ROOM
RCW "B"
RCW "A"
56000mm
CONTROL BLDG.

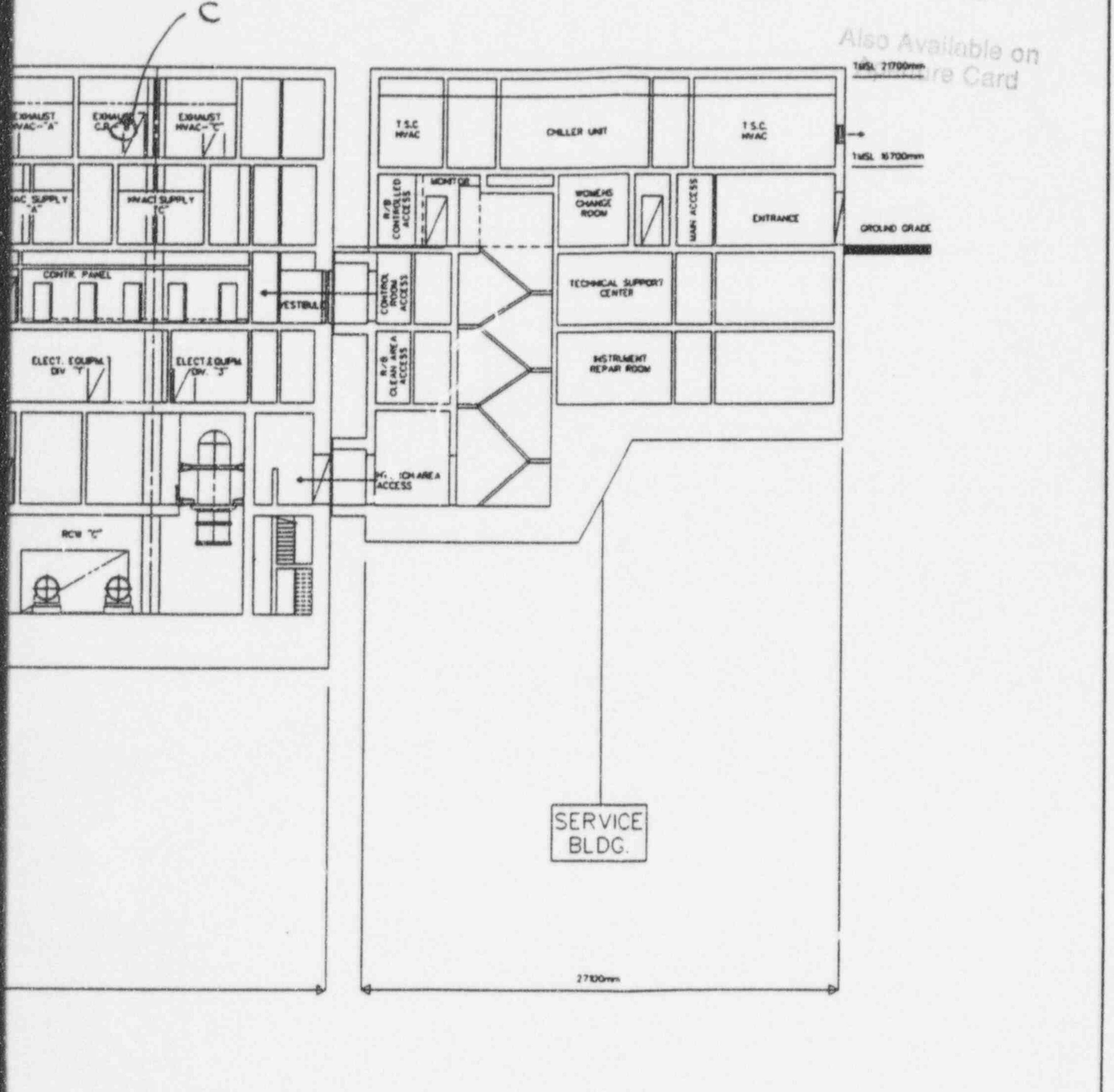


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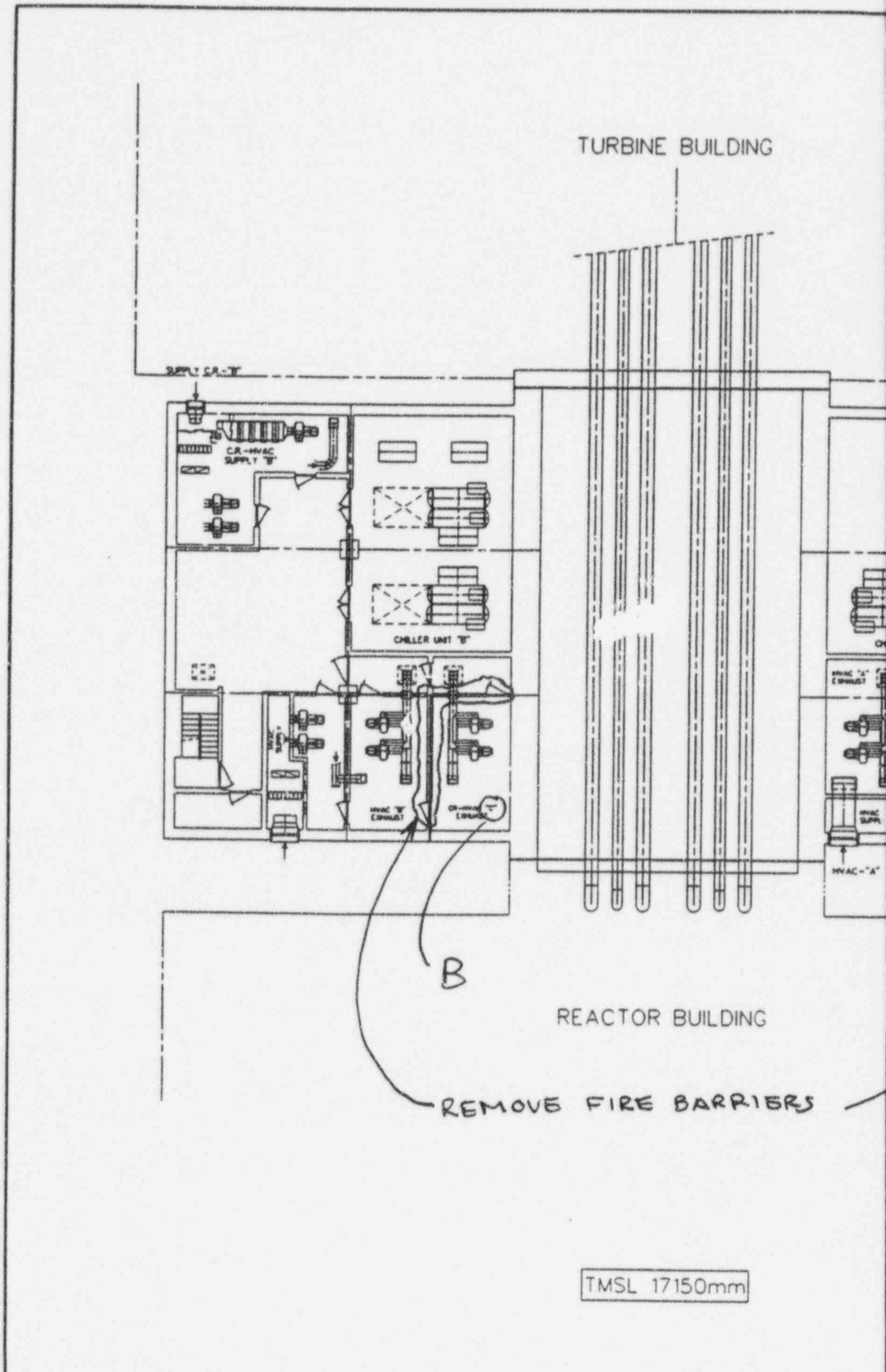
FIGURE 1.2-15 CONTROL & SERVICE BUILDING, ARRANGEMENT ELEVATION, SECTION B-B


TURBINE BUILDING
SUPPLY C.R.-"B"
C.R.-HVAC SUPPLY "B"
CHILLER UNIT "B"
B
REACTOR BUILDING
REMOVE FIRE BARRIERS
TMSL 17150mm

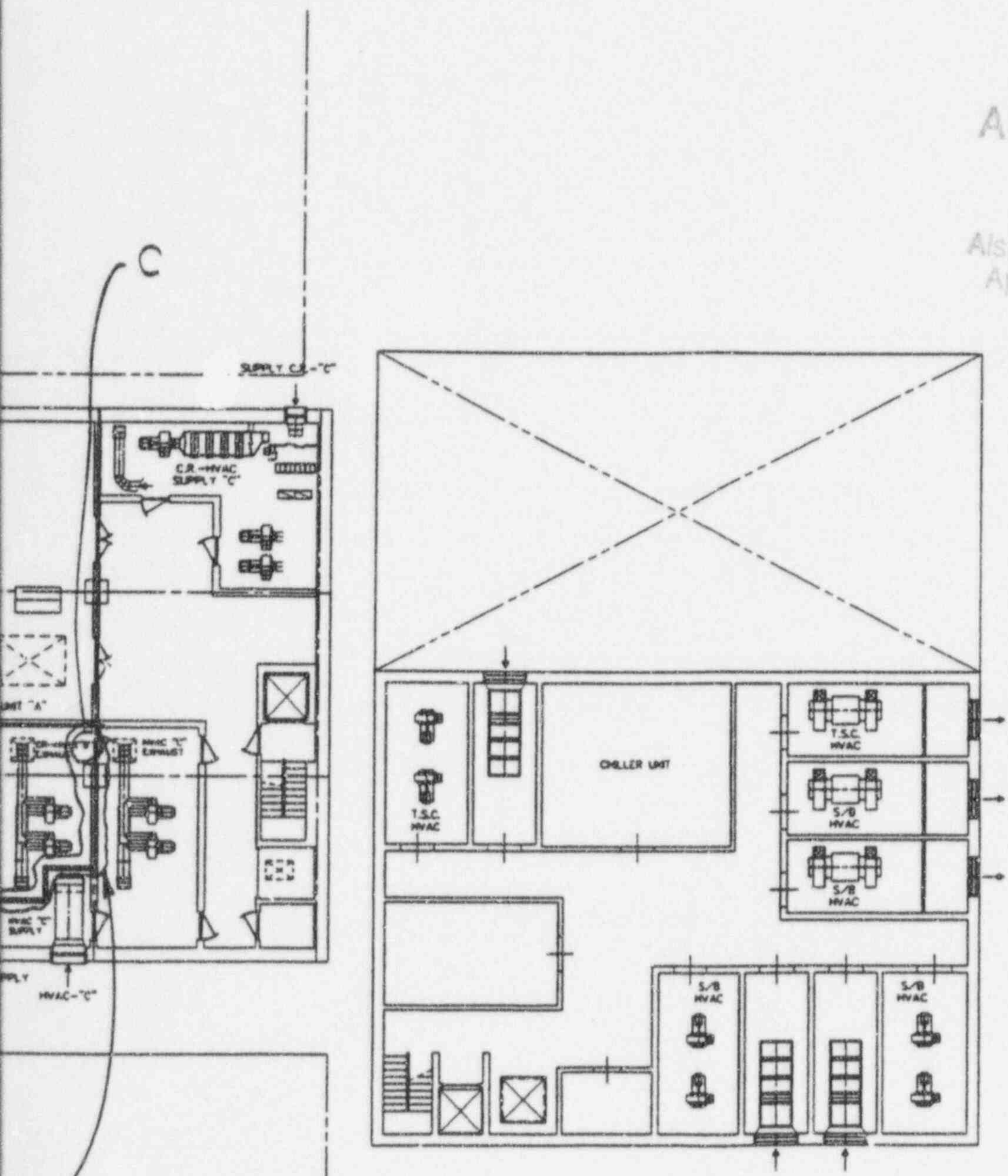


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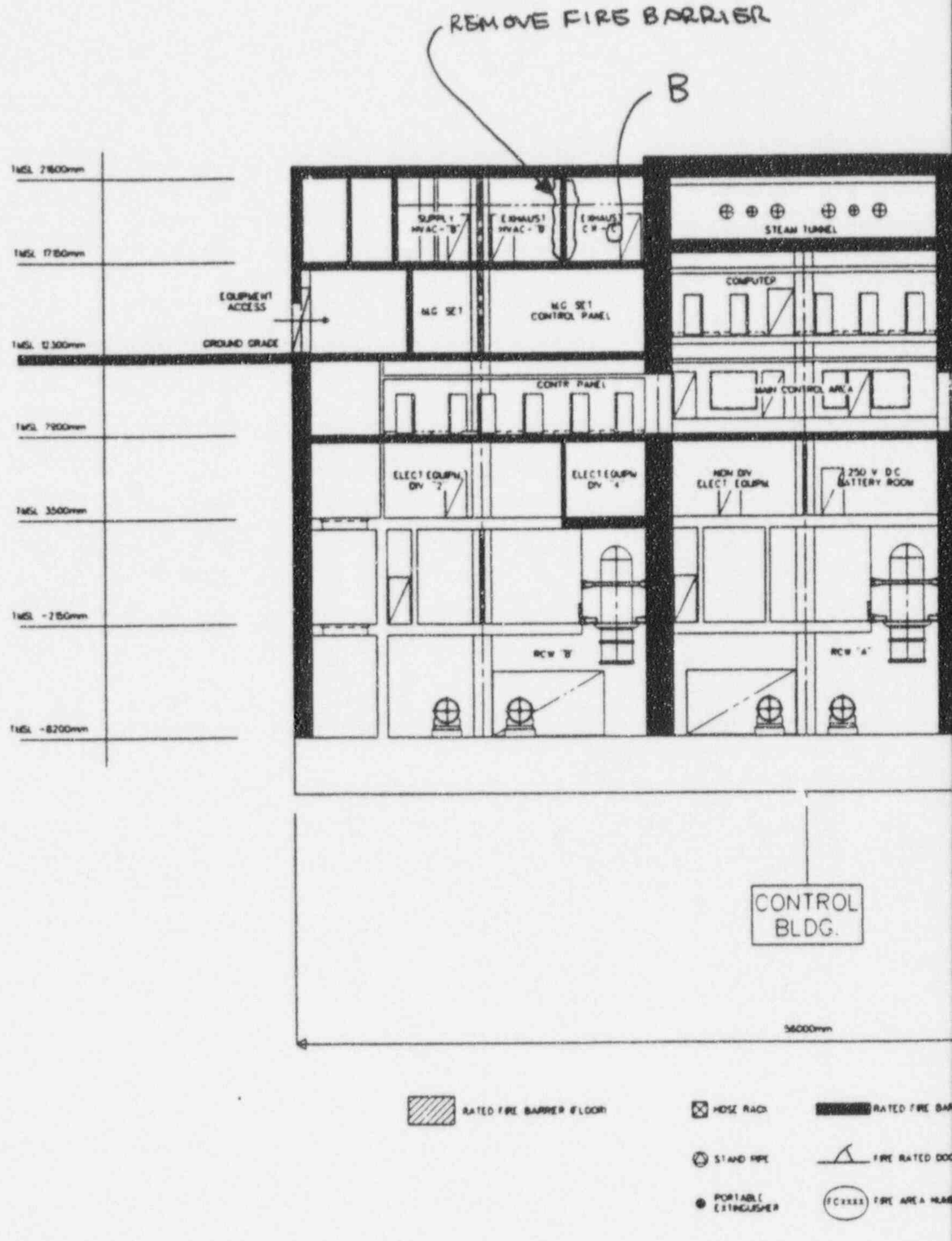
Figure 1.2-21 CONTROL AND SERVICE BUILDING, ARRANGEMENT PLAN AT ELEVATION 17150 mm



REMOVE FIRE BARRIER
B
TMSL 21800mm
TMSL 17150mm
TMSL 12300mm
TMSL 7200mm
TMSL 3500mm
TMSL -2150mm
TMSL -8200mm
EQUIPMENT ACCESS
GROUND GRADE
SUPPLY HVAC-"B"
EXHAUST HVAC-"B"
EXHAUST C.R.-"C"
M.G. SET
M.G. SET CONTROL PANEL
CONTR PANEL
ELECT EQUIPM DIV "2"
ELECT EQUIPM DIV "4"
RCW "B"
STEAM TUNNEL
COMPUTER
MAIN CONTROL AREA
NON DIV ELECT EQUIPM
250 V DC BATTERY ROOM
RCW "A"
CONTROL BLDG.
56000mm
RATED FIRE BARRIER FLOOR
HOSE RACK
STAND PIPE
PORTABLE EXTINGUISHER
RATED FIRE BAR
FIRE RATED DOO
FCXXXX
FIRE AREA NUM

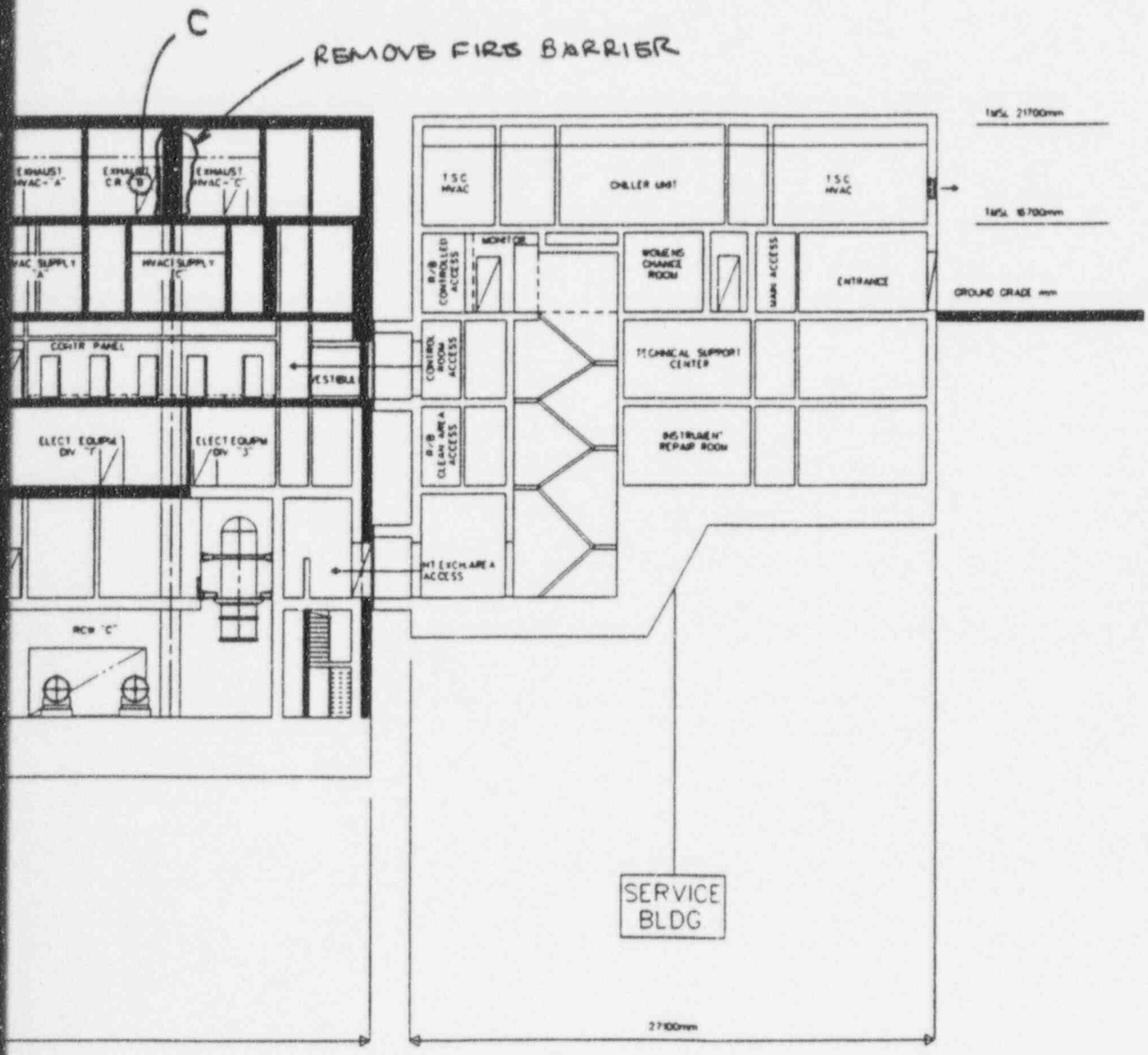


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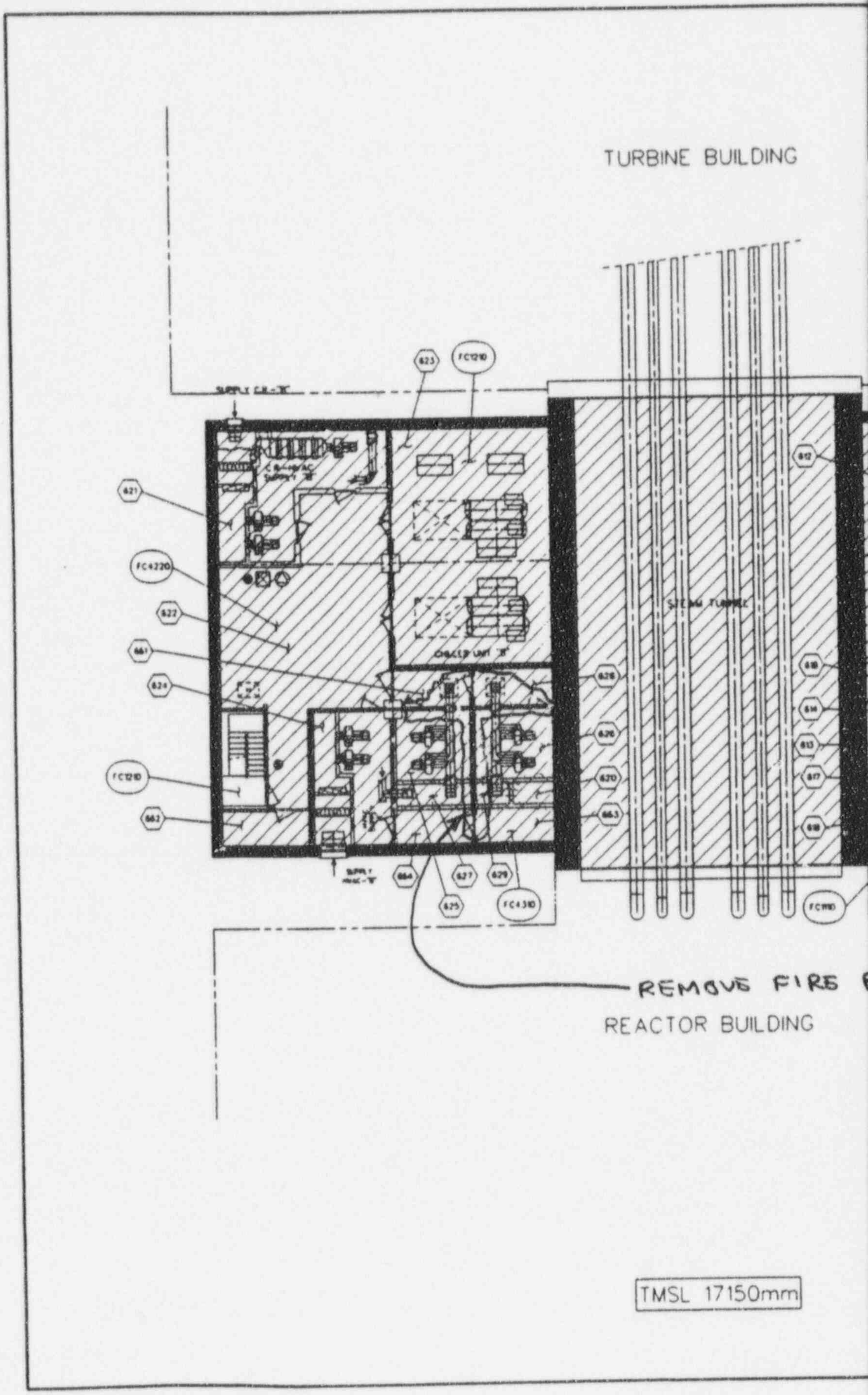
FIGURE 9A.4-11 CONTROL BUILDING FIRE PROTECTION, SECTION B-B


TURBINE BUILDING
REMOVE FIRE
REACTOR BUILDING
TMSL 17150mm

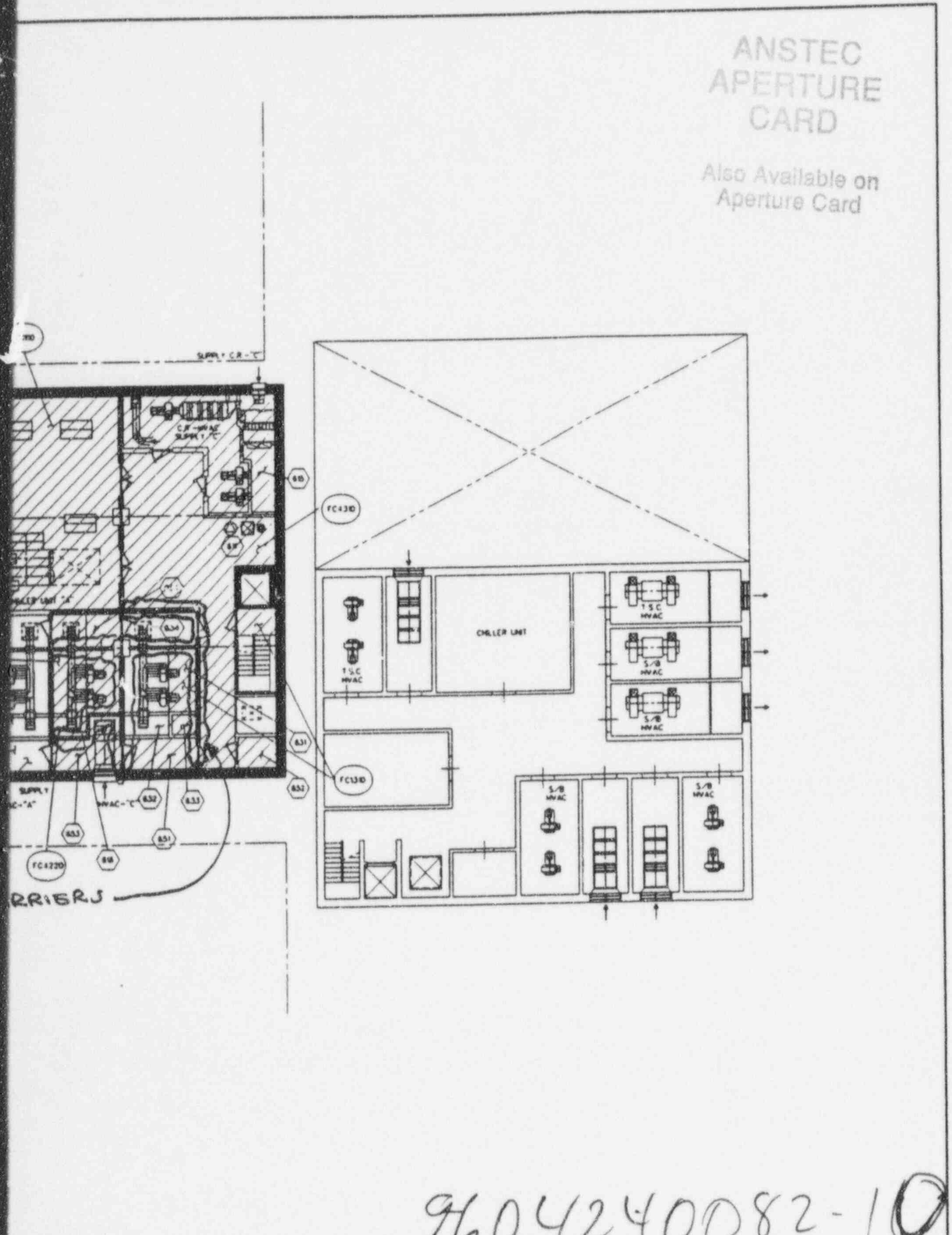
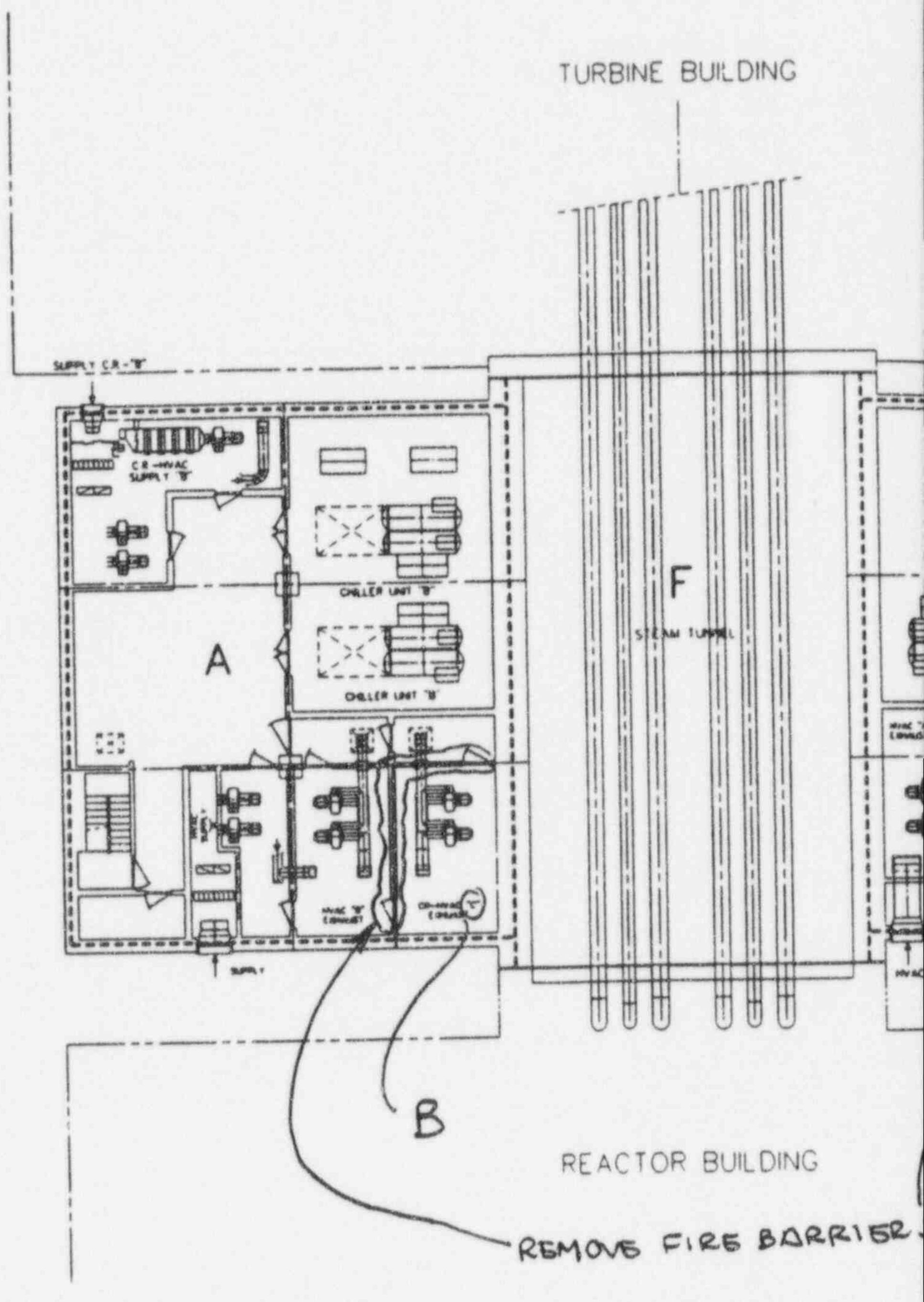


Figure 9A.4-16A CONTROL BUILDING FIRE PROTECTION AT ELEVATION 17150 mm

21-571



TMSL 17150mm

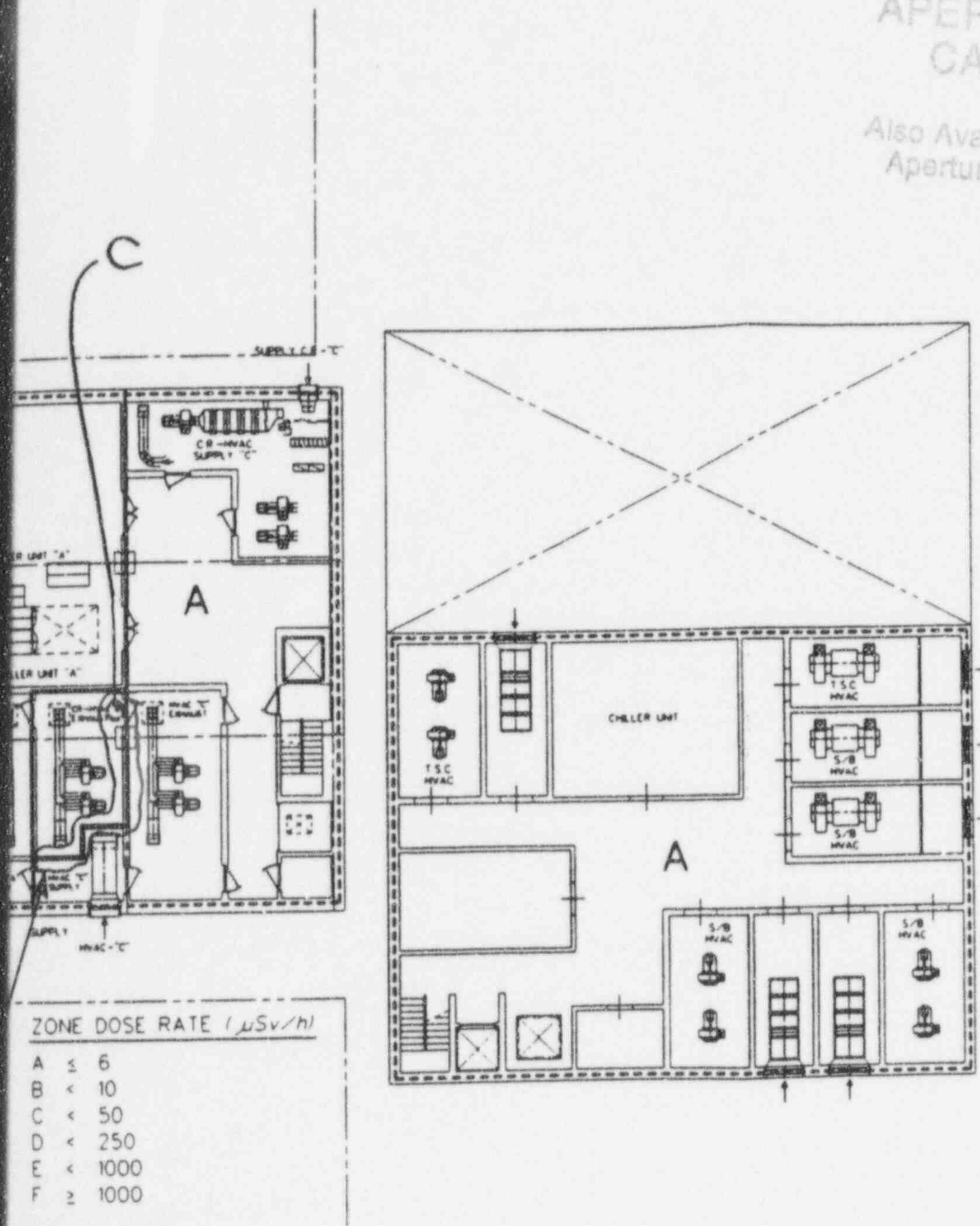


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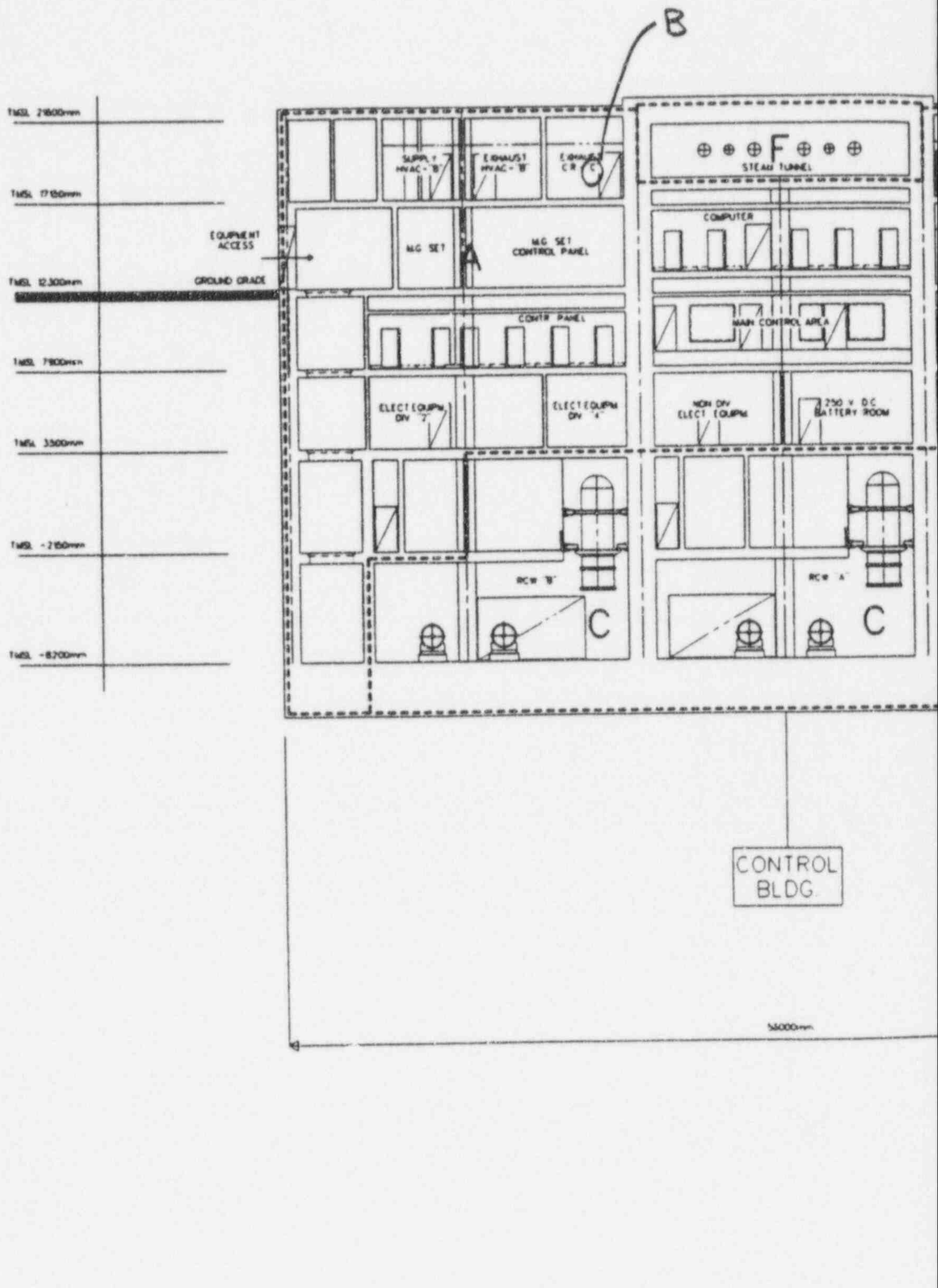
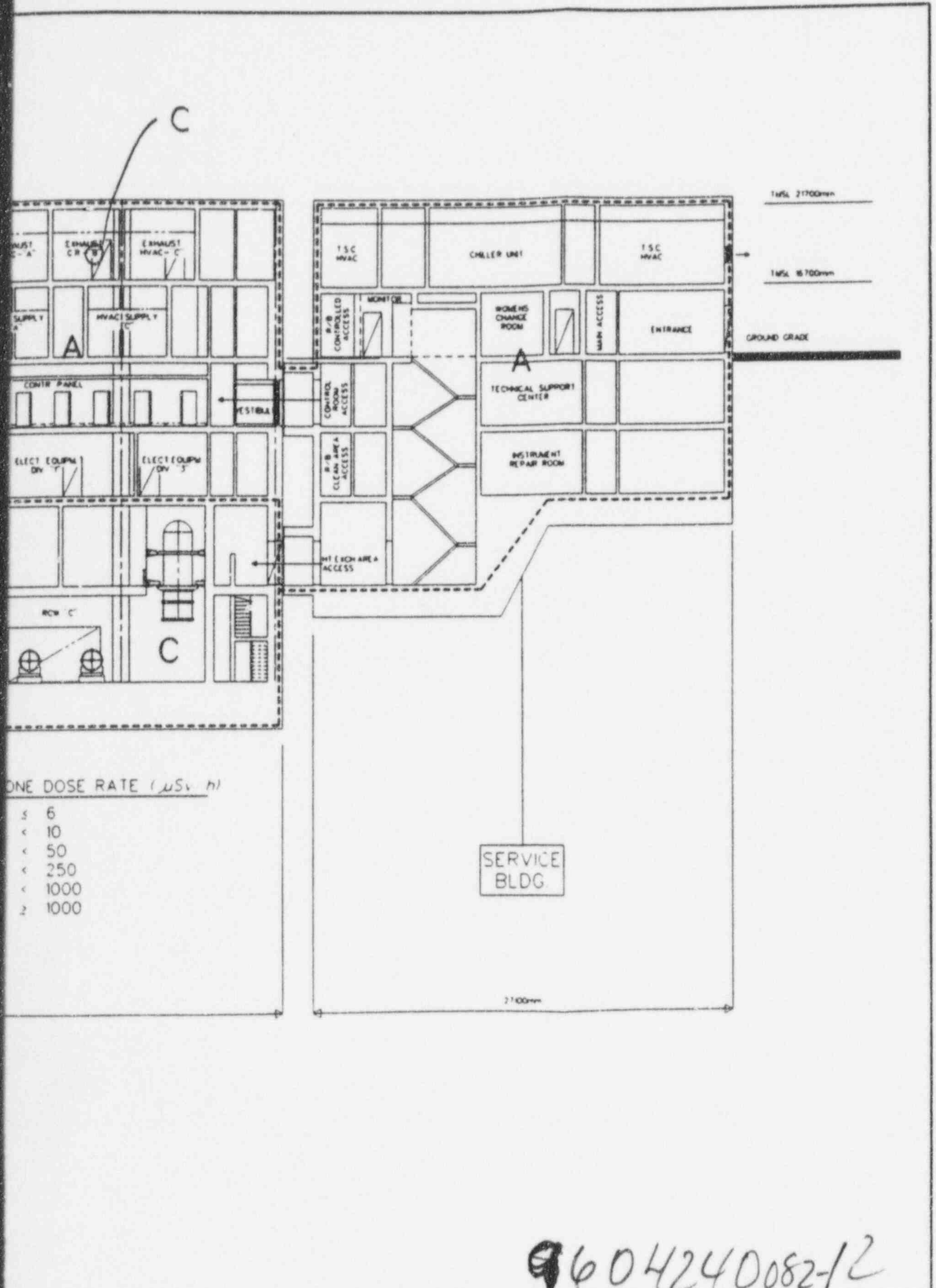
Figure 12.3-47 CONTROL AND SERVICE BUILDING, RADIATION ZONE, NORMAL OPERATION AT ELEVATION 17150 mm


B
TMSL 21800mm
TMSL 17150mm
TMSL 12300mm
TMSL 7900mm
TMSL 3500mm
TMSL -2150mm
TMSL -8200mm
EQUIPMENT ACCESS
GROUND GRADE
SUPPLY HVAC-"B"
EXHAUST HVAC-"B"
EXHAUST CR
C
F
STEAM TUNNEL
M.G SET
A
M.G SET CONTROL PANEL
COMPUTER
CONTR PANEL
MAIN CONTROL AREA
ELECT EQUIPM DIV "2"
ELECT EQUIPM DIV "4"
NON DIV ELECT EQUIPM
250 V DC BATTERY ROOM
RCW "B"
RCW "A"
C
C
CONTROL BLDG.
56000mm



9604240082-12

FIGURE 12.3-48 CONTROL BUILDING, RADIATION ZONE, NORMAL OPERATION, SIDE VIEW

PROPOSED CHANGES

CHANGE PACKAGE NO. 5

Miscellaneous Tier 1 and Tier 2 Changes

(2) The specified division storage tank discharge valve is opened.

(3) The specified division injection pump is started.

(4) The reactor water cleanup isolation valves are closed.

Both divisions of the SLC System are automatically initiated during an ATWS condition by safety system and logic control (SSLC) logic. With the storage tank at minimum level and both pumps operating, the system is designed to inject the minimum required boron solution.

Each SLC System pump has an interlock which prevents operation if both the test tank outlet valve and the pump suction valve are closed.

The SLC System provides borated water to the reactor core to compensate for the various reactivity effects. These effects are xenon decay, elimination of steam voids, changing water density due to the reduction in water temperature, Doppler effect in uranium, changes in neutron leakage, and changes in control rod worth. To meet this objective, it is necessary to inject a quantity of boron which produces a minimum concentration of 850 parts per million (ppm) by weight of natural boron in the reactor core at 20°C. To allow for potential leakage and imperfect mixing in the reactor system, an additional approximately 25% (220 ppm) is added to the above requirement, resulting in a total requirement of greater than or equal to 1070 ppm. The required concentration is thus achieved in a mass of water equal to the sum of the mass of water in the RPV at normal water level (equal to or less than 455×10^3 kg) plus the mass of water in the RPV shutdown cooling piping (equal to or less than 130×10^3 kg). The quantity of boron solution contained in the storage tank above the pump suction shutoff level provides the required concentration of 1070 ppm when injected into the reactor.

The SLC System pumps have sufficient net positive suction head (NPSH) available at the pump. The SLC System pumps are designed to produce discharge pressure to inject the solution into the reactor when the reactor is at pressure conditions corresponding to the system relief valve (10.76 MPaG), which is above peak ATWS pressure in the RPV.

SLC System components required for RPV injection are classified as Seismic Category I.

Figure 2.2.4 shows the ASME Code class for the SLC System piping and components.

The SLC System is located in the Reactor Building. The storage tank, test water tank, the two positive displacement pumps, and associated valving are located in the secondary containment on the floor elevation below the operating floor.

Each of the two SLC System divisions is powered from the respective Class 1E division as shown on Figure 2.2.4. The power supplied to one motor-operated injection valve,

Table 2.4.1 Residual Heat Removal System (Continued)

Inspections, Tests, Analyses and Acceptance Criteria		
Design Commitment	**Inspections, Tests, Analyses**	**Acceptance Criteria**
4. continued c. The RHR pumps have sufficient NPSH.	4. continued c. Inspections, tests and analyses will be performed upon the as -built RHR System. NPSH tests of the pumps will be performed in a test facility. The analyses will consider the effects of: – Pressure losses for pump inlet piping and components. – Suction from the suppression pool with water level at the minimum value. – 50% blockage of pump suction strainers. – Design basis fluid temperature (100°C). – Containment at atmospheric pressure.	4. continued c. The available NPSH exceeds the NPSH required by the pumps.

- Debris plugging of pump suction strainers

Table 2.4.2 High Pressure Core Flooder System (Continued)

Inspections, Tests, Analyses and Acceptance Criteria		
Design Commitment	**Inspections, Tests, Analyses**	**Acceptance Criteria**
d. The HPCF System flow in each division is not less than a value corresponding to a straight line between a flow of 182 m^3/h at a differential pressure of 8.12 MPa and a flow of 727 m^3/h at a differential pressure of 0.69 MPa.	d. Tests will be conducted on each division of the as-built HPCF System in the HPCF high pressure flooder mode. Analyses will be performed to convert the test results to the conditions of the Design Commitment.	d. The converted HPCF flow satisfies the following: The HPCF System flow in each division is not less than a value corresponding to a straight line between a flow of 182 m^3/h at a differential pressure of 8.12 MPa and a flow of 727 m^3/h at a differential pressure of 0.69 MPa.
e. The HPCF System has the capability to deliver at least 50% of the flow rates in item 3d with 171°C water at the pump suction.	e. Analyses will be performed of the as-built HPCF System to assess the system flow capability with 171°C water at the pump suction.	e. The HPCF System has the capability to deliver at least 50% of the flow rates in item 3d with 171°C water at the pump suction.
f. System flow into the reactor vessel is achieved within 16 seconds of receipt of an initiation signal and power available at the emergency busses.	f. Tests will be conducted on each HPCF division using simulated initiation signals.	f. The HPCF System flow is achieved within 16 seconds of receipt of a simulated initiation signal, and power available at the emergency busses.
g. The HPCF pumps have sufficient NPSH available at the pumps.	g. Inspections, tests and analyses will be performed upon the as-built system. NPSH tests of the pumps will be performed in a test facility. The analyses will consider the effects of: – Pressure losses for pump inlet piping and components. – Suction from the suppression pool with water level at the minimum value. – 50% minimum blockage of the pump suction strainers.	g. The available NPSH exceeds the NPSH required by the pumps.

- Debris plugging of pump suction strainers

Table 2.4.4 Reactor Core Isolation Cooling System (Continued)

Inspections, Tests, Analyses and Acceptance Criteria		
Design Commitment	**Inspections, Tests, Analyses**	**Acceptance Criteria**
i. In the RPV water makeup mode, the RCIC pump delivers a flow rate of at least 182 m^3/h against a maximum differential pressure (between the RPV and the pump suction) of 8.12 MPa.	i. Tests will be conducted in a test facility on the RCIC System pump and turbine.	i. (1) The RCIC pump delivers a flow rate of at least 182 m^3/h against a maximum differential pressure (between the RPV and the pump suction) of 8.12 MPa. (2) The RCIC turbine delivers the speed and torque required by the pump at the above conditions.
j. The RCIC System pump has sufficient NPSH.	j. Inspections, tests, and analyses will be performed based upon the as-built system. NPSH tests of the pump will be performed at a test facility. The analyses will consider the effects of: (1) Pressure losses for pump inlet piping and components. (2) Suction from suppression pool with water level at the minimum value. (3) 50% blockage of pump suction strainers. (4) Design basis fluid temperature (77°C). (5) Containment at atmospheric pressure.	j. The available NPSH exceeds the NPSH required by the pump.

(3) Debris plugging of pump suction strainers

Except for the secondary containment isolation dampers, the R/B Secondary Containment HVAC System is classified as non-safety-related.

Normal Operating Mode

In the normal operating mode, two supply fans and two exhaust fans operate. The supply fans operate only when the exhaust fans are operating.

The R/B Secondary Containment HVAC System maintains a negative pressure in the secondary containment relative to the outside atmosphere.

The R/B Secondary Containment HVAC System isolation dampers are closed upon receipt of an isolation signal from the Leak Detection System (LDS) or a signal indicating loss of secondary containment supply and exhaust fans.

Smoke Removal Mode

The smoke removal mode is manually initiated by starting the standby exhaust and supply fans, opening the exhaust filter unit bypass dampers, and partially closing exhaust dampers for divisions not affected by fire.

The R/B Secondary Containment HVAC System penetrations of secondary containment and isolation dampers are classified as Seismic Category I. The R/B Secondary Containment HVAC System is located in the Reactor Building, except for some of the R/B secondary containment HVAC supply and exhaust air components which are located in the Turbine Building.

Each R/B Secondary Containment HVAC System isolation damper requiring electrical power is powered from the Class 1E division, as shown on Figure 2.15.5j. In the R/B Secondary Containment HVAC System, independence is provided between Class 1E divisions, and also between Class 1E divisions and non-Class 1E equipment.

Fire dampers with fusible links in HVAC duct work close under air flow conditions.

The R/B Secondary Containment HVAC System has the following displays and controls in the main control room:

(1) Control and status indication for the active components shown on Figure 2.15.5j.

(2) Parameter displays for the instruments shown on Figure 2.15.5j.

The exhaust duct secondary containment isolation dampers are located in the secondary containment and qualified for a harsh environment.

The pneumatically-operated secondary containment isolation dampers, shown on Figure 2.15.5j, fail to the closed position in the event of loss of pneumatic pressure or loss of electrical power to the valve actuating solenoids.

R/B Primary Containment Supply/Exhaust System

The R/B Primary Containment Supply/Exhaust System removes inert atmosphere and provides air for primary containment prior to personnel entry, and consists of a supply fan, a filter unit, and an exhaust fan as shown on Figure 2.15.5j.

The R/B Primary Containment Supply/Exhaust System is classified as non-safety-related. The R/B Primary Containment Supply/Exhaust System is located in the secondary containment

R/B Main Steam Tunnel HVAC System

The R/B Main Steam Tunnel HVAC System provides cooling to the main steam tunnel and consists of two FCUs. Each FCU has two fans. The FCUs are started manually.

The R/B Main Steam Tunnel HVAC System is classified as non-safety-related. The R/B Main Steam Tunnel HVAC System is located in the Reactor Building.

R/B Non-Safety-Related Equipment HVAC System

The R/B Non-Safety-Related Equipment HVAC System provides cooling to the non-safety-related equipment rooms. There are six fan coil units, and four air handling units in the system, each consisting of cooling coil and fans.

The R/B Non-Safety-Related Equipment HVAC System is classified as non-safety-related, and is located in the Reactor Building.

Reactor Internal Pump ASD HVAC System

The Reactor Internal Pump ASD HVAC System provides cooling to the RIP ASD power panels. The system consists of a two recirculating air conditioning units with cooling coils and four supply fans.

The RIP ASD HVAC System is classified as non-safety-related, and is located in the Reactor Building.

Turbine Island HVAC System

The Turbine Island HVAC System provides heating, cooling, and ventilation for the Turbine Island. The Turbine Island HVAC System consists of the following non-safety-related systems.

(1) Turbine Building (T/B) HVAC System.

(2) Electrical Building (E/B) HVAC System.

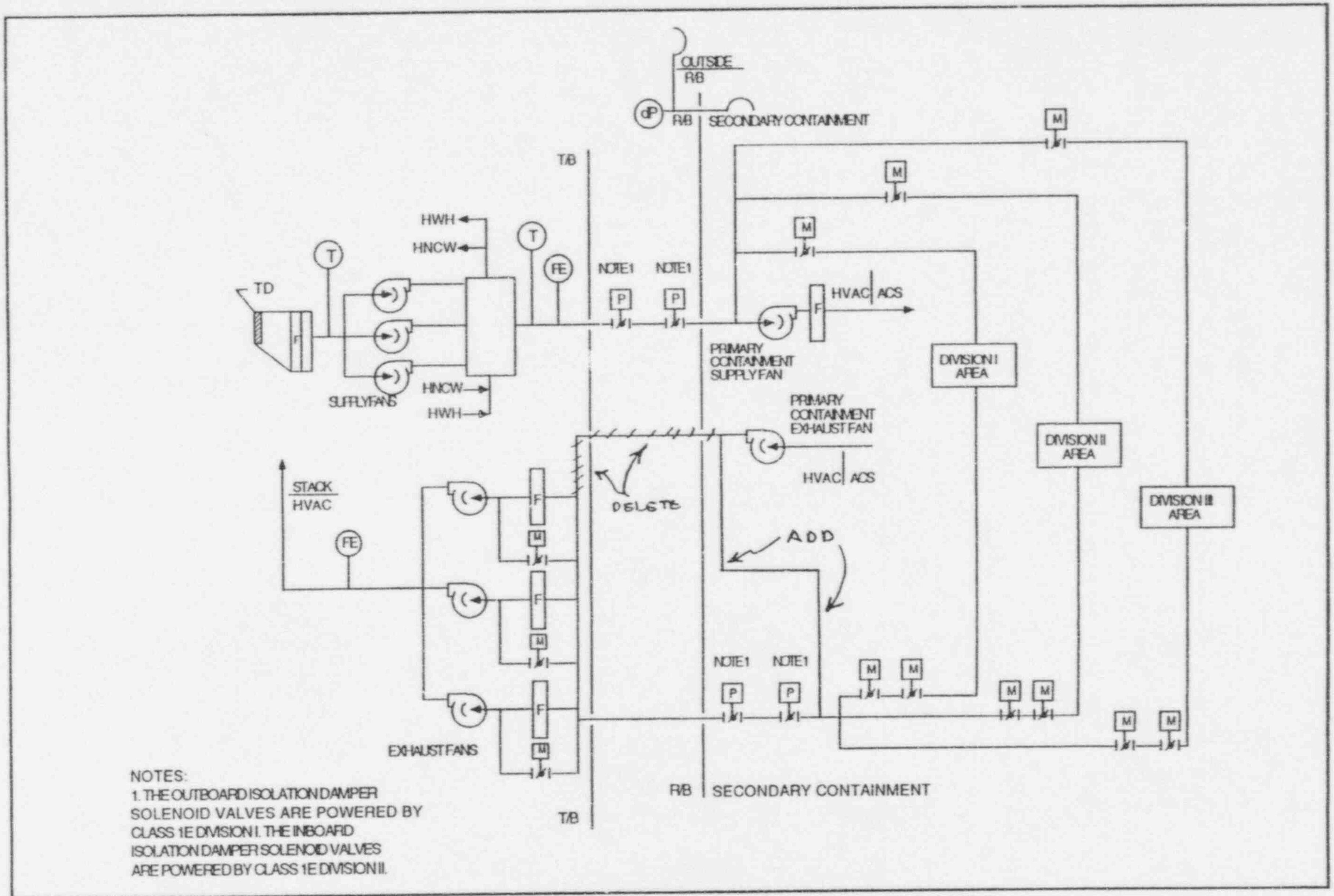


Figure 2.15.5j Reactor Building Secondary Containment HVAC System

Table 2.15.5f Reactor Building Secondary Containment HVAC System

Inspections, Tests, Analyses and Acceptance Criteria		
Design Commitment	**Inspections, Tests, Analyses**	**Acceptance Criteria**
1. The basic configuration of the R/B Secondary Containment HVAC System is as shown on Figure 2.15.5j.	1. Inspections of the as-built system will be conducted.	1. The as-built R/B Secondary Containment HVAC System conforms with the basic configuration shown on Figure 2.15.5j.
2. The R/B Secondary Containment HVAC System maintains a negative pressure in the secondary containment relative to the outside atmosphere.	2. Tests will be conducted on the R/B Secondary Containment HVAC System in the normal mode of operation.	2. The R/B Secondary Containment HVAC System maintains a negative pressure in the secondary containment relative to the outside atmosphere.
3. The R/B Secondary Containment HVAC System isolation dampers are closed upon receipt of an isolation signal from the LDS, or signal indicating loss of secondary containment exhaust fans. supply and	3. Tests will be conducted on the R/B Secondary Containment HVAC System using simulated LDS isolation and loss of secondary containment supply and exhaust fans signals.	3. Upon receipt of a simulated signal, isolation dampers are automatically closed.
4. The smoke removal mode is manually initiated by starting the standby exhaust and supply fans, operating the exhaust filter unit bypass dampers, and partially closing the exhaust dampers for divisions not affected by fire.	4. Tests will be conducted in the smoke removal mode.	4. On manual initiation of smoke removal mode the following occurs: a. The standby exhaust fan starts. b. The standby supply fan starts. c. The filter unit bypass damper opens. d. The exhaust dampers of divisions not affected by fire partially close to a predetermined position. e. The measured air flow rate and the pressure in the ducts are at least equal to the values of the as-built smoke removal analysis.

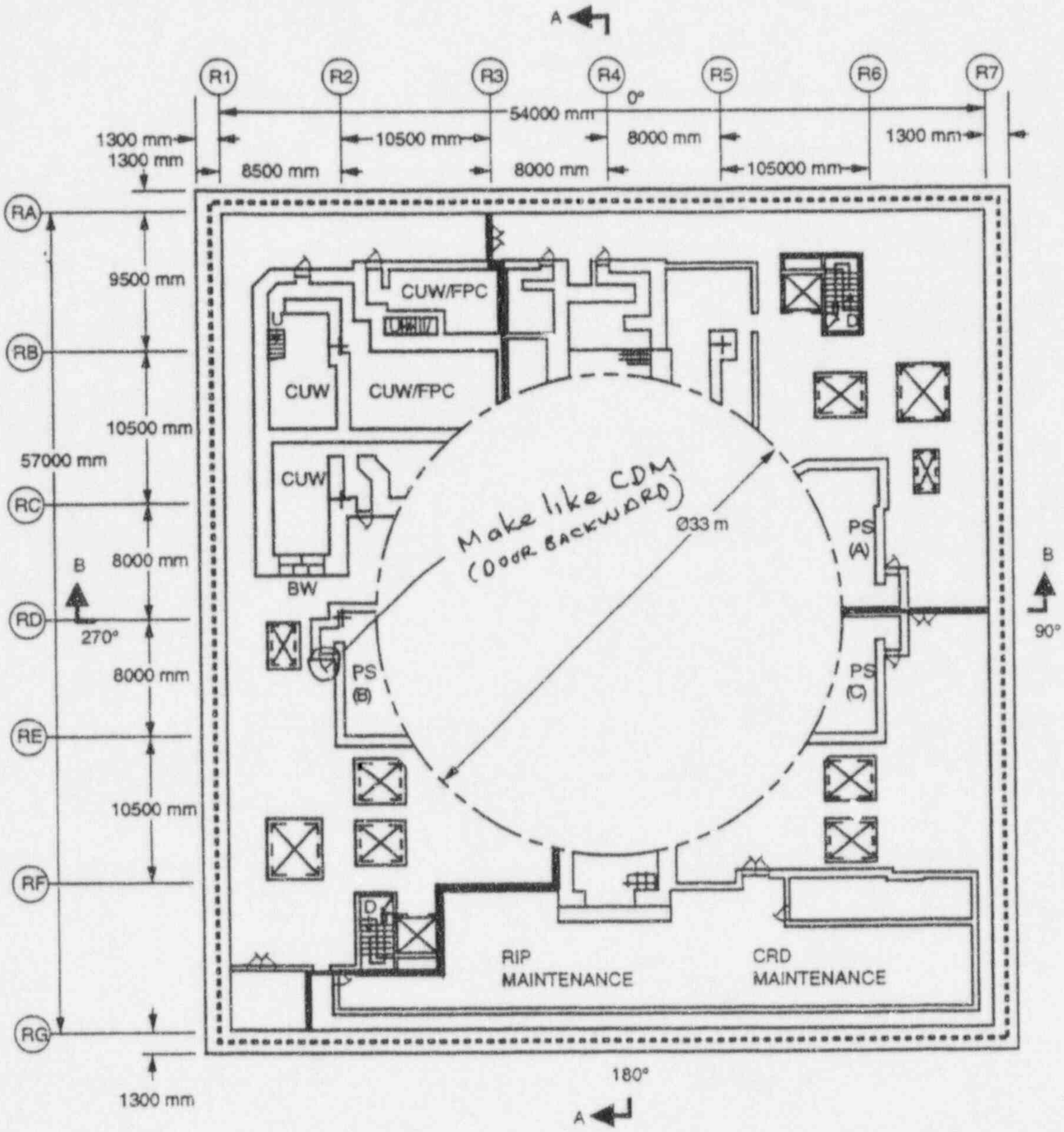


Figure 2.15.10f Reactor Building Arrangement, Floor B2F—Elevation –1700 mm

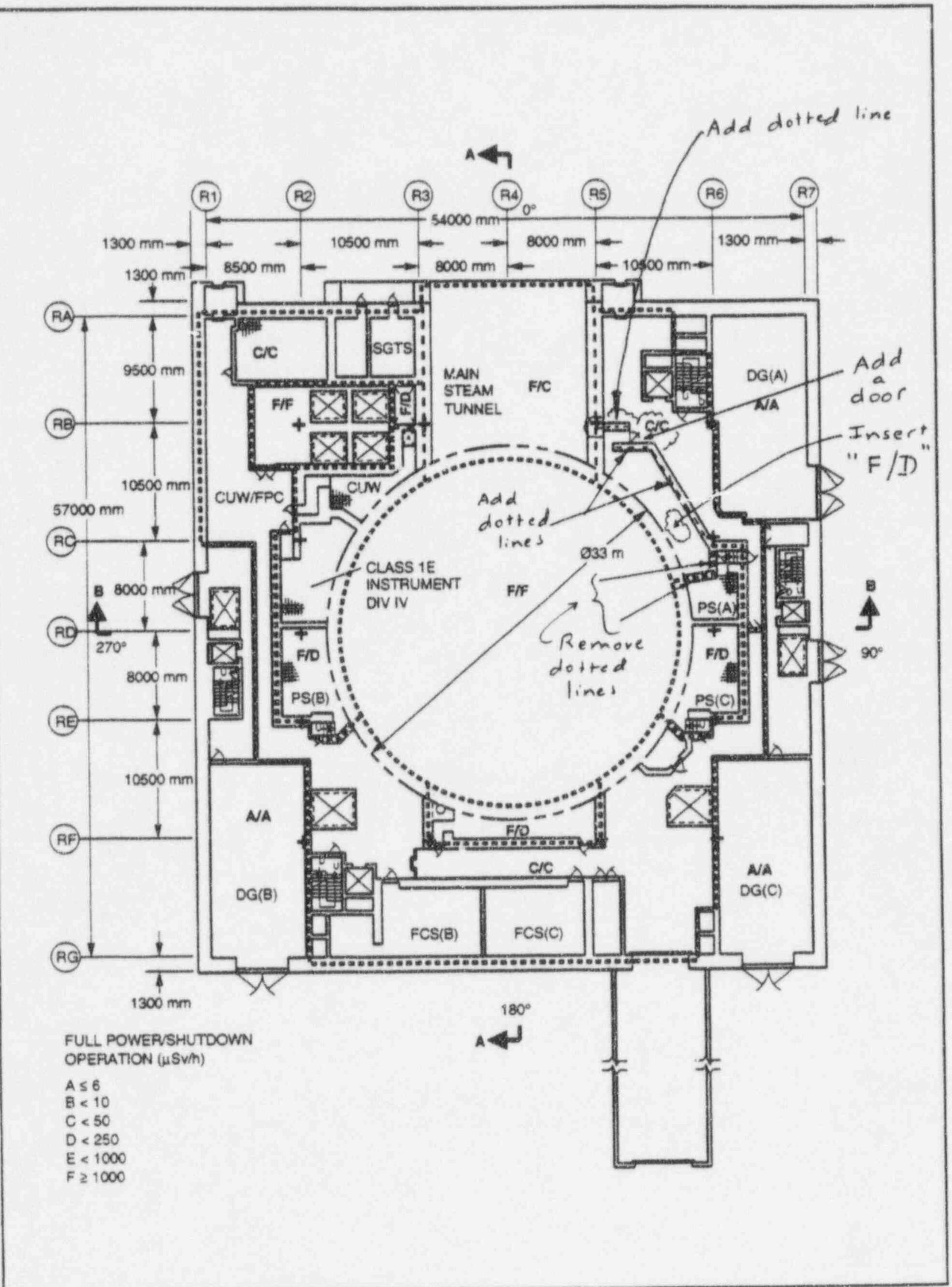


Figure 3.2i Reactor Building Radiation Zone Map for Full Power and Shutdown Operations, Floor 1F—Elevation 12300 mm

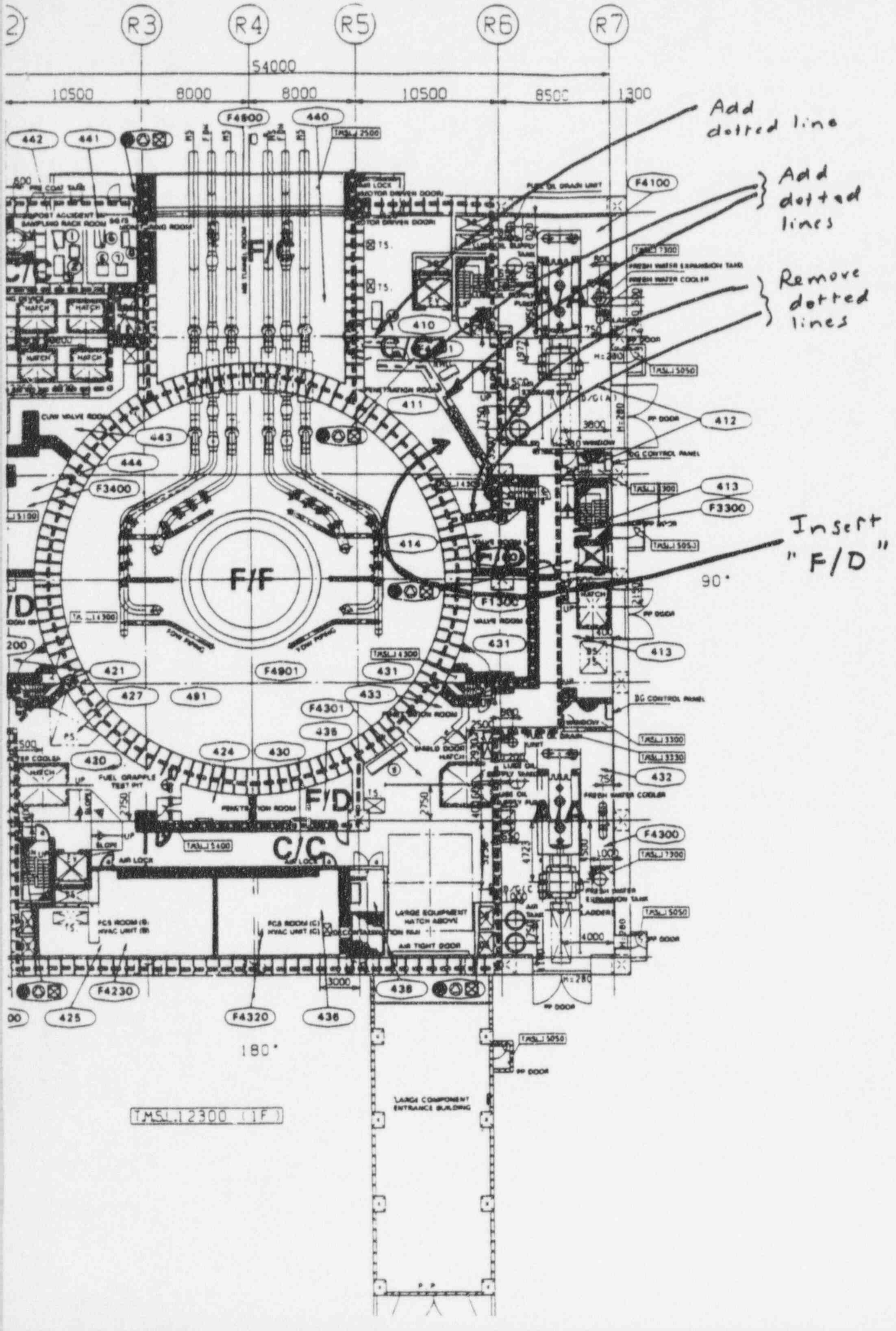


Figure 12.3-5 REACTOR BUILDING RADIATION ZONE MAP FOR FULL POWER AND SHUTDOWN OPERATION AT ELEVATION 12300 mm

PROPOSED CHANGES

CHANGE PACKAGE NO. 6

Independence of Power for Each Pair of Motor-Operated Isolation Dampers

In the high radiation mode, a positive pressure of at least 3.2 mm water gauge is maintained in the MCAE relative to the outside atmosphere. Each emergency filtration unit treats a mixture of MCAE recirculated air and outside makeup air to maintain the positive pressure with not more than 360 m^3 per hour (@ one atmosphere absolute pressure, 0°C) of outside air.

The redundant division of the CRHA HVAC System starts on a low flow signal from the operating emergency filtration unit. The redundant division is connected to an outside air intake, which is separated from the other intake by a minimum of 50m.

Outside Smoke Mode

When smoke detection sensors in the operating outside air intake detect smoke, a signal will initiate MCAE air recirculation by isolating the outside air intake, closing the exhaust damper and stopping the exhaust fan.

From Change N. 3

Smoke Remov~~e~~al Mode

The smoke removal mode is manually initiated by closing the recirculation damper~~, stopping the exhaust fan, and opening the exhaust fan bypass damper to allow outside air purging of the MCAE.~~ and starting both exhaust fans at high speed.

The remaining discussion in this section is not mode-specific and applies (unless stated otherwise) to the entire CRHA HVAC System.

MCAE temperature is maintained between 21°C and 26°C, with a relative humidity between 10% and 60%, except when in the smoke removal mode.

The CRHA HVAC System is classified as Seismic Category I. The CRHA HVAC System is located in the Control Building.

Replace with Insert "A"

Each of the two CRHA HVAC System divisions is powered from the respective Class 1E division as shown on Figure 2.15.5a. In the CRHA HVAC System, independence is provided between Class 1E divisions, and also between the Class 1E divisions, and non-Class 1E equipment.

Each mechanical division of the CRHA HVAC System (Divisions B and C) is physically separated from the other division, except for the common ducts in the MCAE.

Fire dampers with fusible links in HVAC duct work close under air flow conditions.

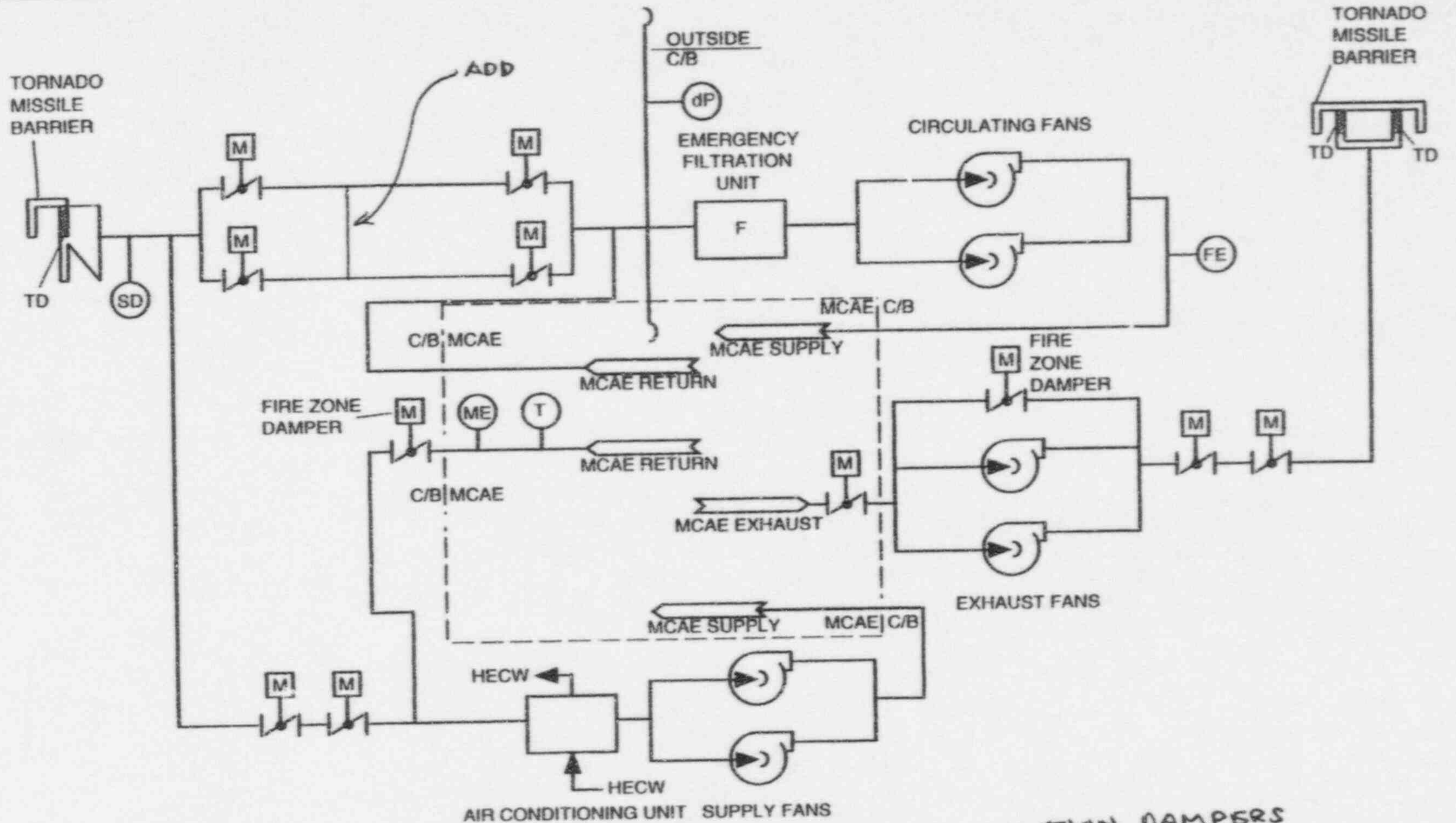
The CRHA HVAC System has the following displays and controls in the main control room:

(1) Controls and status indication for the active safety-related components shown on Figure 2.15.5a.

Change No. 6

INSERT "A"
(For DCD Tier 1, Page 2.15.5-2

Each of the two CRHA HVAC System divisions, with the exception of the motor operated isolation dampers, is powered from the respective Class 1E division as shown on Figure 2.15.5a. Each pair of motor operated isolation dampers in series is powered from two independent Class 1E divisions (one damper is powered from Class 1E division II and the other damper is from Class 1E division III). In the CRHA HVAC System, independence is provided between Class 1E divisions, and also between the Class 1E divisions and non-Class 1E equipment.



EXCEPT MOTOR OPERATED ISOLATION DAMPERS

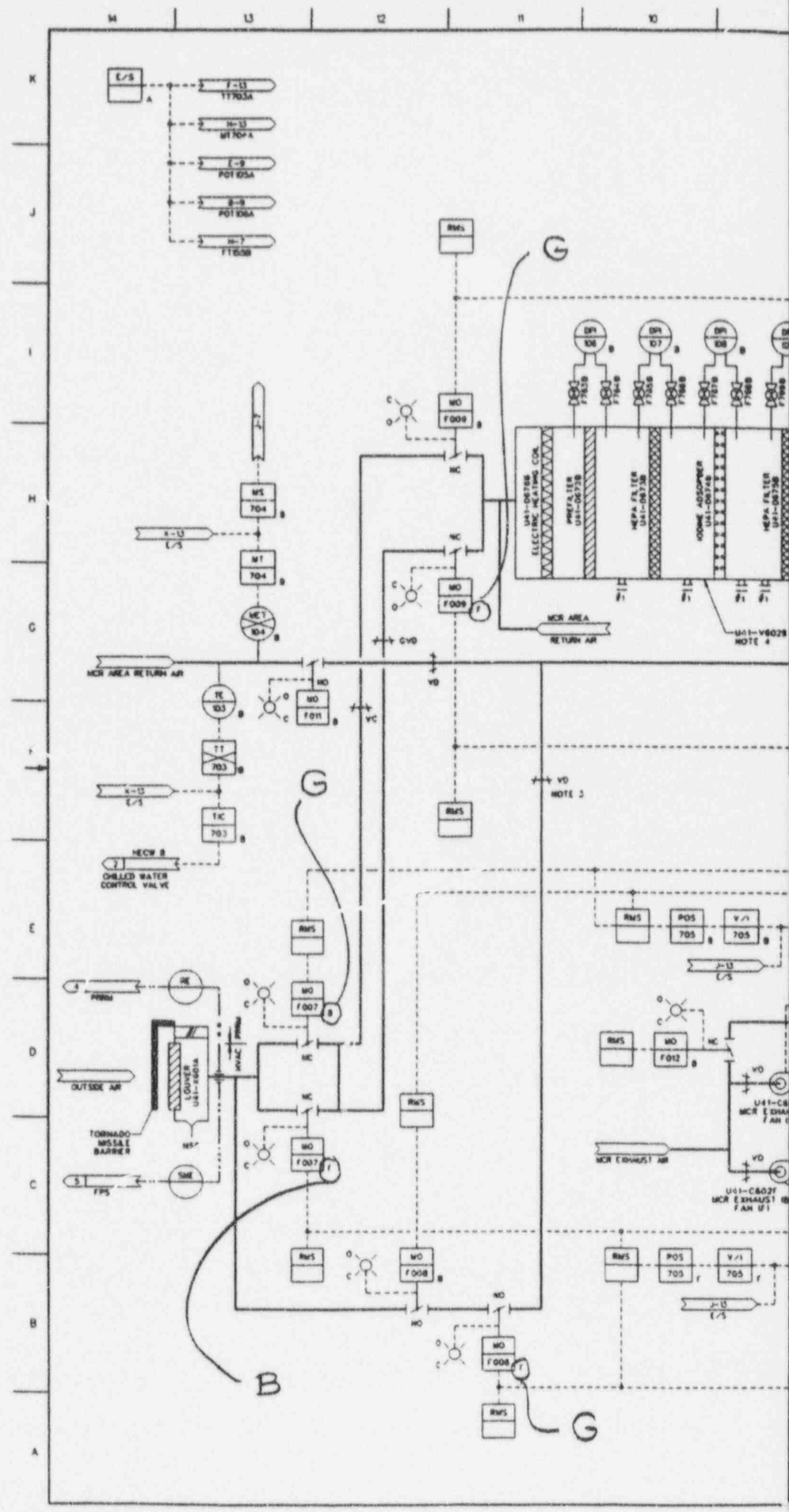
NOTES:

1. THIS FIGURE SHOWS ONE OF TWO IDENTICAL DIVISIONS. ELECTRICAL POWER LOADS FOR THE COMPONENTS OF DIVISION B ARE POWERED FROM CLASS 1E DIVISION II. ELECTRICAL POWER LOADS FOR THE COMPONENTS OF DIVISION C ARE POWERED FROM CLASS 1E DIVISION III.

EXCEPT MOTOR OPERATED ISOLATION DAMPERS

Figure 2.15.5a Control Room Habitability Area HVAC System

2. EACH PAIR OF MOTOR OPERATED ISOLATION DAMPERS HAS ONE DAMPER POWERED FROM CLASS 1E DIVISION II AND THE OTHER DAMPER FROM CLASS 1E DIVISION III ← ADD



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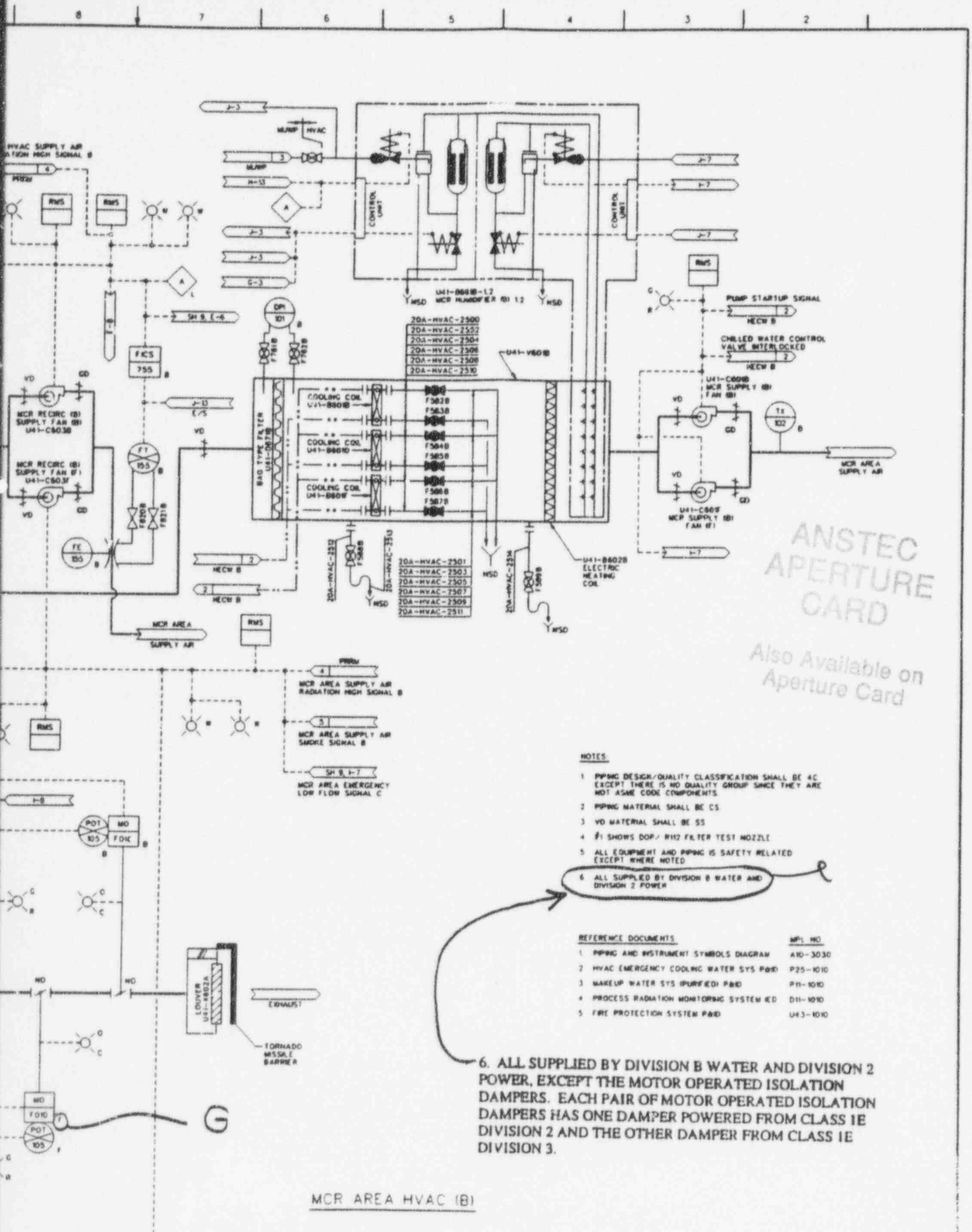

NOTES:

1. PIPING DESIGN/QUALITY CLASSIFICATION SHALL BE 4C EXCEPT THERE IS NO QUALITY GROUP SINCE THEY ARE NOT ASME CODE COMPONENTS.
2. PIPING MATERIAL SHALL BE CS.
3. VD MATERIAL SHALL BE SS.
4. #1 SHOWS DOP/ R112 FILTER TEST NOZZLE
5. ALL EQUIPMENT AND PIPING IS SAFETY RELATED EXCEPT WHERE NOTED
6. ALL SUPPLIED BY DIVISION B WATER AND DIVISION 2 POWER

REFERENCE DOCUMENTS	MPL NO
1. PIPING AND INSTRUMENT SYMBOLS DIAGRAM	A10-3030
2. HVAC EMERGENCY COOLING WATER SYS P&ID	P25-1010
3. MAKEUP WATER SYS (PURIFIED) P&ID	P11-1010
4. PROCESS RADIATION MONITORING SYSTEM IED	D11-1010
5. FIRE PROTECTION SYSTEM P&ID	U43-1010

6. ALL SUPPLIED BY DIVISION B WATER AND DIVISION 2 POWER, EXCEPT THE MOTOR OPERATED ISOLATION DAMPERS. EACH PAIR OF MOTOR OPERATED ISOLATION DAMPERS HAS ONE DAMPER POWERED FROM CLASS 1E DIVISION 2 AND THE OTHER DAMPER FROM CLASS 1E DIVISION 3.

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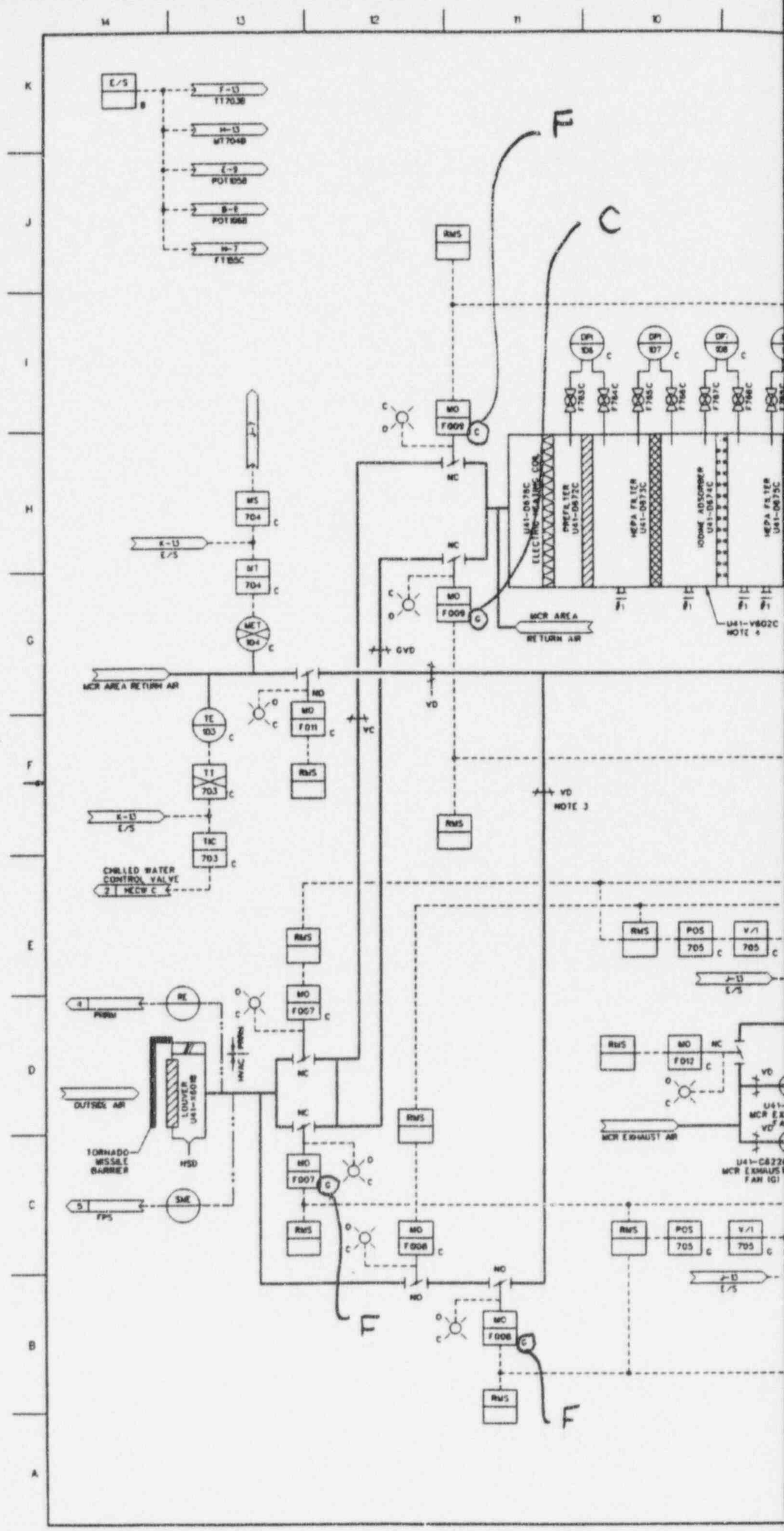
FIGURE 9.4-1 CONTROL BUILDING HVAC FLOW DIAGRAM (Sheet 1 of 5)



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E-9 PDT105B
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H-7 FT155C
RMS
MO F009
MO F011
MO F007
MO F008
MO F012
DPI 106
DPI 107
DPI 108
ELECTRIC HEATING COIL
PREFILTER U41-D872C
HEPA FILTER U41-D873C
IODINE ADSORBER U41-D874C
HEPA FILTER U41-D875C
U41-V602C NOTE 4
MCR AREA RETURN AIR
MCR AREA RETURN AIR
MS 704
MT 704
MET 104
K-13 E/S
TE 103
TT 703
TIC 703
CHILLED WATER CONTROL VALVE
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VD NOTE 3
NC
NO
POS 705
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LOUVER U41-Y601B
TORNADO MISSILE BARRIER
HSD
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FPS
HVAC PRRM
MCR EXHAUST AIR
U41-C822C MCR EXHAUST FAN (C)
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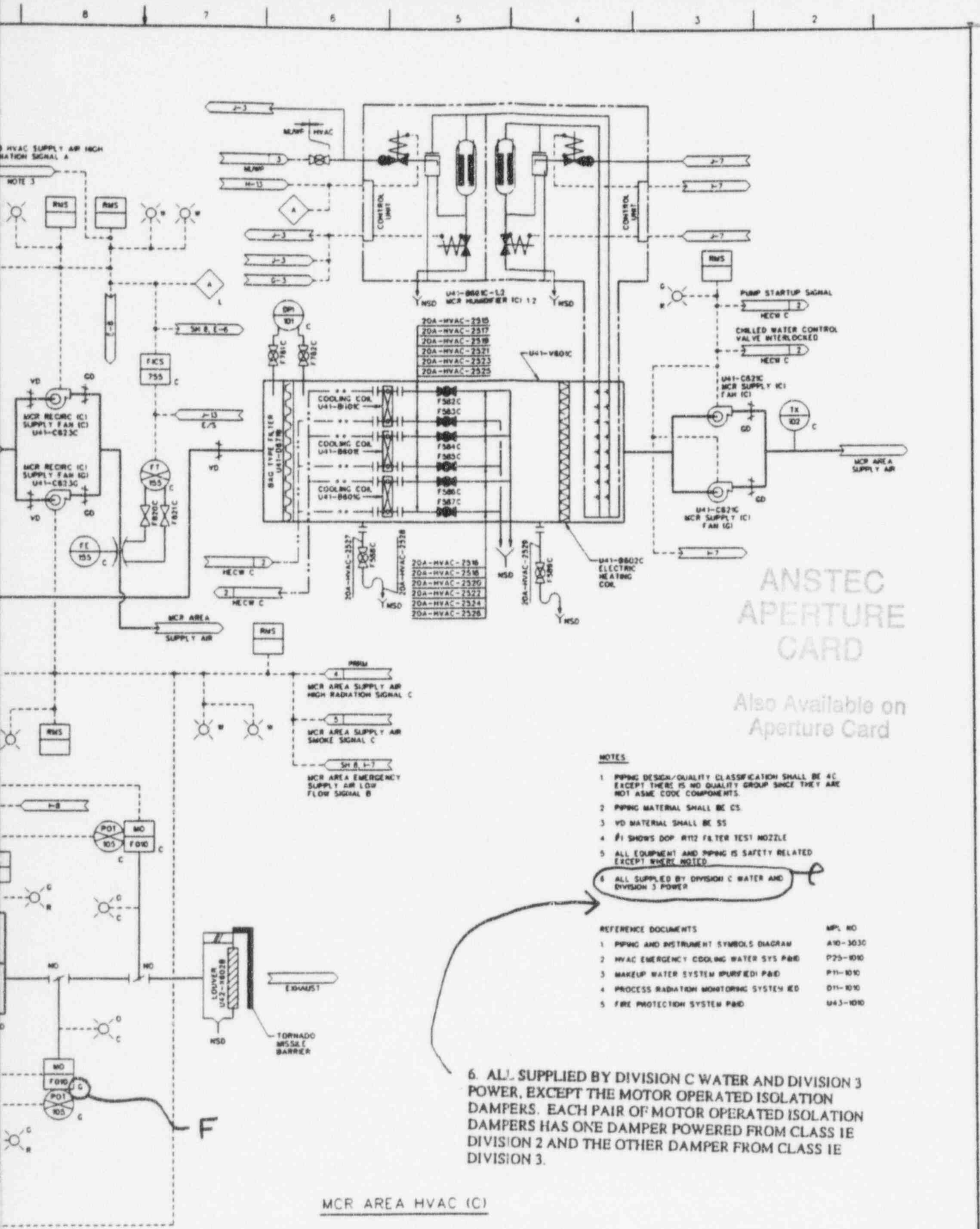

NOTES

1. PIPING DESIGN/QUALITY CLASSIFICATION SHALL BE 4C EXCEPT THERE IS NO QUALITY GROUP SINCE THEY ARE NOT ASME CODE COMPONENTS.
2. PIPING MATERIAL SHALL BE CS.
3. VD MATERIAL SHALL BE SS.
4. #1 SHOWS DOP R112 FILTER TEST NOZZLE
5. ALL EQUIPMENT AND PIPING IS SAFETY RELATED EXCEPT WHERE NOTED.
6. ALL SUPPLIED BY DIVISION C WATER AND DIVISION 3 POWER

REFERENCE DOCUMENTS	MPL NO
1 PIPING AND INSTRUMENT SYMBOLS DIAGRAM	A10-3030
2 HVAC EMERGENCY COOLING WATER SYS P&ID	P25-1010
3 MAKEUP WATER SYSTEM (PURIFIED) P&ID	P11-1010
4 PROCESS RADIATION MONITORING SYSTEM IED	D11-1010
5 FIRE PROTECTION SYSTEM P&ID	U43-1010

6. ALL SUPPLIED BY DIVISION C WATER AND DIVISION 3 POWER, EXCEPT THE MOTOR OPERATED ISOLATION DAMPERS. EACH PAIR OF MOTOR OPERATED ISOLATION DAMPERS HAS ONE DAMPER POWERED FROM CLASS 1E DIVISION 2 AND THE OTHER DAMPER FROM CLASS 1E DIVISION 3.

FIGURE 9.4-1 CONTROL BUILDING HVAC FLOW DIAGRAM (Sheet 2 of 5)

PROPOSED CHANGES

CHANGE PACKAGE NO. 7

Eliminate RCIC Exhaust Bypass Line and Rupture Disks

Table 3.9-8 Inservice Testing Safety-Related Pumps and Valves (Continued)

No.	Qty	Description (h) (i)	Safety Class (a)	Code Cat. (c)	Valve Func (d)	Test Para (e)	Test Freq (f)	Tier 2 Fig. (g)
F722	1	Turbine exhaust pressure instrument root valve	2	B	P		E1	5.4-8 sh. 3
F723	1	Turbine exhaust pressure instrument root valve	2	B	P		E1	5.4-8 sh. 3
F724	1	Turbine exhaust pressure between rupture disk instrument root valve	2	B	P		E1	5.4-8 sh. 3
F725	1	Turbine exhaust pressure between rupture disk instrument root valve	2	B	P		E1	5.4-8 sh. 3
D014	1	Turbine exhaust pressure rupture disk	2	D	A	Rplc.	5 yr	5.4-8 sh. 3
D015	1	Turbine exhaust pressure rupture disk	2	D	A	Rplc.	5 yr	5.4-8 sh. 3
G31 Reactor Water Cleanup System Valves								
F001	1	Line inside containment from RHR system maintenance valve	1	B	P		E1	5.4-12 sh. 1
F002	1	CUW System suction line inboard isolation valve	1	A	I,A	L,P S	RO 3 mo	5.4-12 sh. 1
F003	1	CUW System suction line outboard isolation valve	1	A	I,A	L,P S	RO 3 mo	5.4-12 sh. 1
F017	1	CUW System RPV head spray line outboard isolation valve (h3)	1	A	I,A	L,P S	RO CS	5.4-12 sh. 1
F018	1	CUW System RPV head spray line inboard check valve (h1)	1	A, C	I,A	L, S	RO	5.4-12 sh. 1
F019	1	CUW System bottom head drain line maintenance valve	1	B	P		E1	5.4-12 sh. 1
F026	1	CUW System suction line shutoff valve	1	B	P	P,S	RO	5.4-12 sh. 1
F050	1	Test line off the suction line outboard isolation valve G31-F003	2	B	P		E1	5.4-12 sh. 1
F058	1	Test line off RPV head spray line outboard isolation valve	2	B	P		E1	5.4-12 sh. 1

Delete

* HPCF Interface Piping 200A-HPCF-015-S, 1.37 MPaG, 66°C,B (S1,S2), As (open pathway to Condensate Storage Tank with LO valves).

** Suction Piping from Suppression Pool Interface 200A-RCIC-004-W, 0.310 MPaG, 104°C, 3B, As.

RCIC discharge from relief valves and test line valve direct to the suppression pool without restriction.

Reference	Components	Press./Temp./Design/ Seismic Class	Remarks
Sheet 1	50A-RCIC-009-W Pipe	0.310 MPaG, 104°C,3B,As	No change
	50A-RCIC-019-W Pipe	0.310 MPaG, 104°C,3B,As	No change
	100A-RCIC-007-W Pipe	0.310 MPaG, 104°C,3B,As	No change
	250A-RHR- 008 Pipe	0.310 MPaG, 104°C,3B,As	No change
Sheet 1	Suppression Pool		

ABWR High Press. Core Flooder System, Tier 2 Figure 6.3-7, components interfacing with RCIC System are not upgraded because this is the open pathway to the condensate storage tank vented to the atmosphere.

Reference	Components	Press./Temp./Design/ Seismic Class	Remarks
Sheet 1	200A-HPCF-015-W Pipe	1.37 MPaG, 66°C,B (S1,S2), As	No change
	400A-HPCF-105-W Pipe	1.37 MPaG, 66°C,B (S1,S2), As	No change
	500A-HPCF-004-W Pipe	1.37 MPaG, 66°C,B (S1,S2), As	No change
	300A-HPCF-001-W Pipe	1.37 MPaG, 66°C,B (S1,S2), As	No change
	300A-HPCF-002-W Pipe	1.37 MPaG, 66°C,B (S1,S2), As	No change
	300A-HPCF-003-W Pipe	1.37 MPaG, 66°C,B (S1,S2), As	No change

ABWR Makeup Water System (Condensate), Tier 2 Figure 9.2-4, components interfacing with HPCF System are not upgraded due to the open pathway to the condensate storage tank vented to the atmosphere.

Reference	Components	Press./Temp./Design/ Seismic Class	Remarks
Sheet 1	300A-MUWC-F100 Valve	1.37 MPaG, 66°C,B (S1,S2), As	No change
	300A-MUWC-F101 Valve	1.37 MPaG, 66°C,B (S1,S2), As	No change
	300A-MUWC-F102 Valve	1.37 MPaG, 66°C,B (S1,S2), As	No change
	300A-MUWC-100 Pipe Static Hd,	66°C,B (S1,S2), As	No change
	300A-MUWC-101 Pipe Static Hd,	66°C,B (S1,S2), As	No change
	300A-MUWC-102 Pipe Static Hd,	66°C,B (S1,S2), As	No change
	Condensate Storage Tank,	66°C,4D, Non-seismic	No change

Replace all four with "8.62"

RCIC turbine condensate piping to the suppression pool

Replace all four with "302"

Reference	Components	Press./Temp./Design/ Seismic Class	Remarks
Sheet 3	250A-RCIC-037-S Pipe	2.82 MPaG, 184°C,3B,As	Was 0.981 MPaG
	20A-RCIC-720-S Pipe	2.82 MPaG, 184°C,3B,As	Was 0.981 MPaG
	20A-RCIC-F722 Valve	2.82 MPaG, 184°C,3B,As	Was 0.981 MPaG
	20A-RCIC-PI012 P.Ind.	2.82 MPaG, 184°C,3B,As	Was 0.981 MPaG

	350A-RCIC-Cond. Chamber	~~2.82~~ MPaG, ~~184~~°C,3B,As	Was 0.981 MPaG

Reference	Components	Press./Temp./Design/ Seismic Class	Remarks
	350A-RCIC-038-S Pipe	~~2.82~~ MPaG, ~~184~~°C,3B,As	Was 0.981 MPaG
	~~* 250A-RCIC-504-S Pipe~~	~~2.82 MPaG, 184°C,3B,As~~	~~Was 0.981 MPaG~~
	~~* 250A-RCIC-D014 Rup.Disk~~	~~2.82 MPaG, 184°C,3B,As~~	~~Was 0.981 MPaG~~
	~~* 250A-RCIC-D015 Rup.Disk~~	~~2.82 MPaG, 184°C,3B,As~~	~~Was 0.981 MPaG~~
	20A-RCIC-721-S Pipe	2.82 MPaG, 184°C,3B,As	Was 0.981 MPaG
	20A-RCIC-F723 Valve	2.82 MPaG, 184°C,3B,As	Was 0.981 MPaG
	20A-RCIC-722-S Pipe	2.82 MPaG, 184°C,3B,As	Was 0.981 MPaG
	20A-RCIC-PT013A P.Trans	2.82 MPaG, 77°C,3B,As	Was 1.37 MPaG
	20A-RCIC-PT013E P.Trans	2.82 MPaG, 77°C,3B,As	Was 1.37 MPaG
	** 25A-RCIC-051-S Pipe	2.82 MPaG, 184°C,3B,As	Was 0.981 MPaG
	** 25A-RCIC-F051 Valve	2.82 MPaG, 184°C,3B,As	Was 0.981 MPaG
	** 25A-RCIC-D012 Strainer	2.82 MPaG, 184°C,3B,As	Was 0.981 MPaG
	** 25A-RCIC-D013 S.Trap	2.82 MPaG, 184°C,3B,As	Was 0.981 MPaG
	** 25A-RCIC-F052 Valve	2.82 MPaG, 184°C,3B,As	Was 0.981 MPaG
Sheet 3	** 25A-RCIC-052-S Pipe	2.82 MPaG, 184°C,4D,As	Was 0.981 MPaG
Sheet 1	350A-RCIC-F038 Check	2.82 MPaG, 77°C,3B,As	Was 1.37 MPaG
	20A-RCIC-053-S Pipe	2.82 MPaG, 184°C,3B,As	Was 0.981 MPaG
	20A-RCIC-F053 T.Valve	2.82 MPaG, 184°C,3B,As	Was 0.981 MPaG
	350A-RCIC-F039 Valve	2.82 MPaG, 184°C,3B,As	Was 0.981 MPaG
	A-RCIC-F069 T.Valve	2.82 MPaG, 184°C,3B,As	Was 10.981 MPaG
	350A-RCIC-039-S Pipe	0.981 MPaG, 184°C,3B,As	No change
Sheet 1	Suppression Pool		

* Vent via Rupture Disks.

** RCIC Turbine Condensate Piping to the Barometric Condenser.

RCIC vacuum tank condensate piping to the suppression pool.

Reference	Components	Press./Temp./Design/ Seismic Class	Remarks
Sheet 3	50A-RCIC-Vacuum Pump	2.82 MPaG, 121°C,4D,As	Was 0.755 MPaG
	50A-RCIC-044-S Pipe	2.82 MPaG, 88°C,4D,As	Was 0.310 MPaG
	50A-RCIC-067-S Pipe	2.82 MPaG, 88°C,4D,As	Was 0.310 MPaG
	50A-RCIC-PCV Valve	2.82 MPaG, 121°C,4D,As	Was 0.755 MPaG
Sheet 3	20A-RCIC-068-S Pipe	2.82 MPaG, 121°C,4D,As	Was 0.981 MPaG
Sheet 1	50A-RCIC-F046 Check V.	2.82 MPaG, 104°C,3B,As	Was 0.310 MPaG
	20A-RCIC-057-S Pipe	2.82 MPaG, 104°C,3B,As	Was 0.310 MPaG
	20A-RCIC-F059 T.Valve	2.82 MPaG, 104°C,3B,As	Was 0.310 MPaG
	50A-RCIC-F047 MO Valve	2.82 MPaG, 104°C,3B,As	Was 0.310 MPaG
	50A-RCIC-045-S Pipe	0.981 MPaG, 104°C,3B,As	No change
Sheet 1	Suppression Pool		

RCIC steam drains from trip and throttle valve piping and turbine to condensate chamber.

Reference	Components	Press./Temp./Design/ Seismic Class	Remarks
Sheet 3	* 20A-RCIC-063-S Pipe	2.82 MPaG, 184°C,3B,As	Was 0.981 MPaG

(2) The RCIC pump discharge line is the other line that penetrates the RCPB, which directs flow into a feedwater line just outboard of the primary containment. This line has a testable check valve and an automatic motor-operated valve located outside primary containment.

(3) The RCIC turbine exhaust line also penetrates the containment. Containment penetration is located about a meter above the suppression pool maximum water level. A vacuum breaking line with two vacuum breakers in series runs in the suppression pool air space and connects to the RCIC turbine exhaust line inside the containment. Located outside the containment in the turbine exhaust line is a remote-manually controlled motor-operated isolation valve.

(4) The RCIC pump suction line, minimum flow pump discharge line, and turbine exhaust line penetrate the containment and are submerged in the suppression pool. The isolation valves for these lines are outside the containment and require automatic isolation operation, except for the turbine exhaust line which has remote manual operation.

The RCIC System design includes interfaces with redundant leak detection devices, monitoring:

(1) A high pressure drop across a flow device in the steam supply line equivalent to 300% of the steady-state steam flow at 8.22 MPaA pressure.

(2) A high area temperature utilizing temperature switches as described in the leak detection system (high area temperature shall be alarmed in the control room).

(3) A low reactor pressure of 0.34 MPaG minimum.

(4) A high pressure ~~between~~ in the RCIC turbine exhaust ~~rupture diaphragms.~~ line.

These devices, activated by the redundant power supplies, automatically isolate the steam supply to the RCIC turbine and trip the turbine. The HPCF System provides redundancy for the RCIC System should it become isolated.

5.4.6.1.2 Reliability, Operability, and Manual Operation

5.4.6.1.2.1 Reliability and Operability

The RCIC System (Table 3.2-1) is designed commensurate with the safety importance of the system and its equipment. Each component is individually tested to confirm compliance with system requirements. The system as a whole is tested during both the startup and pre-operational phases of the plant to set a base mark for system reliability.

On RCIC System startup, bypass valve F045 (provided to reduce the frequency of turbine overspeed trips) opens to accelerate the turbine to an initial peak speed of approximately 157 rad/s; now under governor control, turbine speed is returned to the low limit turbine speed demand of 73.3 rad/s to 104.7 rad/s. After a predetermined delay (5 to 10 s), the steam supply valve leaves the full closed position and the ramp generator is released. The low signal select feature selects and sends this increasing ramp signal to the governor. The turbine increases in speed until the pump flow satisfies the controller setpoint. Then the controller leaves saturation, responds to the input error, and integrates the output signal to satisfy the input demand.

The operator has the capability to select manual control of the governor, and adjust speed and flow (within hardware limitations) to match decay heat steam generation during the period of RCIC operation.

The RCIC pump delivers the makeup water to the reactor vessel through the feedwater line, which distributes it to obtain mixing with the hot water or steam within the reactor vessel.

The RCIC turbine will trip automatically upon receipt of any signal indicating turbine overspeed, low pump suction pressure, high turbine exhaust pressure, or an auto-isolation signal. Automatic isolation occurs upon receipt of any signal indicating:

(1) A high pressure drop across a flow device in the steam supply line equivalent to 300% of the steady-state steam flow at 8.22 MPaA.

(2) A high area temperature.

(3) A low reactor pressure of 0.34 MPaG minimum.

(4) A high pressure ~~between~~ in the turbine exhaust ~~rupture diaphragms.~~ line.

The steam supply valve F037, steam supply bypass valve F045 and cooling water supply valve F012 will close upon receipt of signal indicating high water level (Level 8) in the reactor vessel. These valves will reopen (auto-restart) should an indication of low water level (Level 2) in the reactor vessel occur. Water Level 2 automatically resets the water level trip signal. The RCIC System can also be started, operated, and shut down remote-manually provided initiation or shutdown signals do not exist.

5.4.6.2.5.3 Test Mode

A design functi[illegible] test of the RCIC System may be performed during normal plant operation by [illegible] suction from the suppression pool and discharging through a full flow test return line back to the suppression pool. The discharge valve to the vessel remains closed [illegible] test mode operation. The system will automatically return from

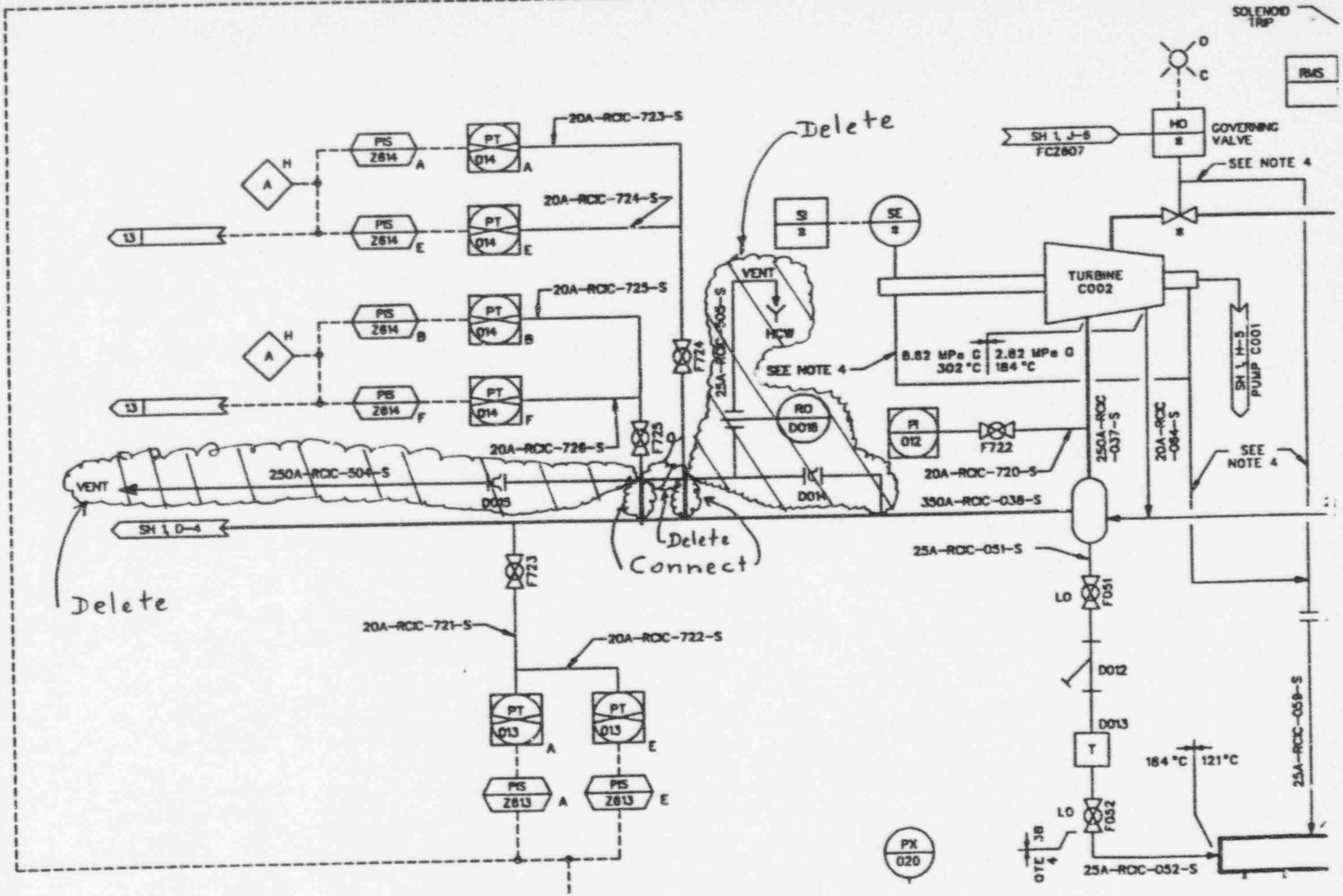

FIGURE 5.4-8 REACTOR CORE ISOLATION COOLING SYSTEM P&ID (Sheet 3 of 3)

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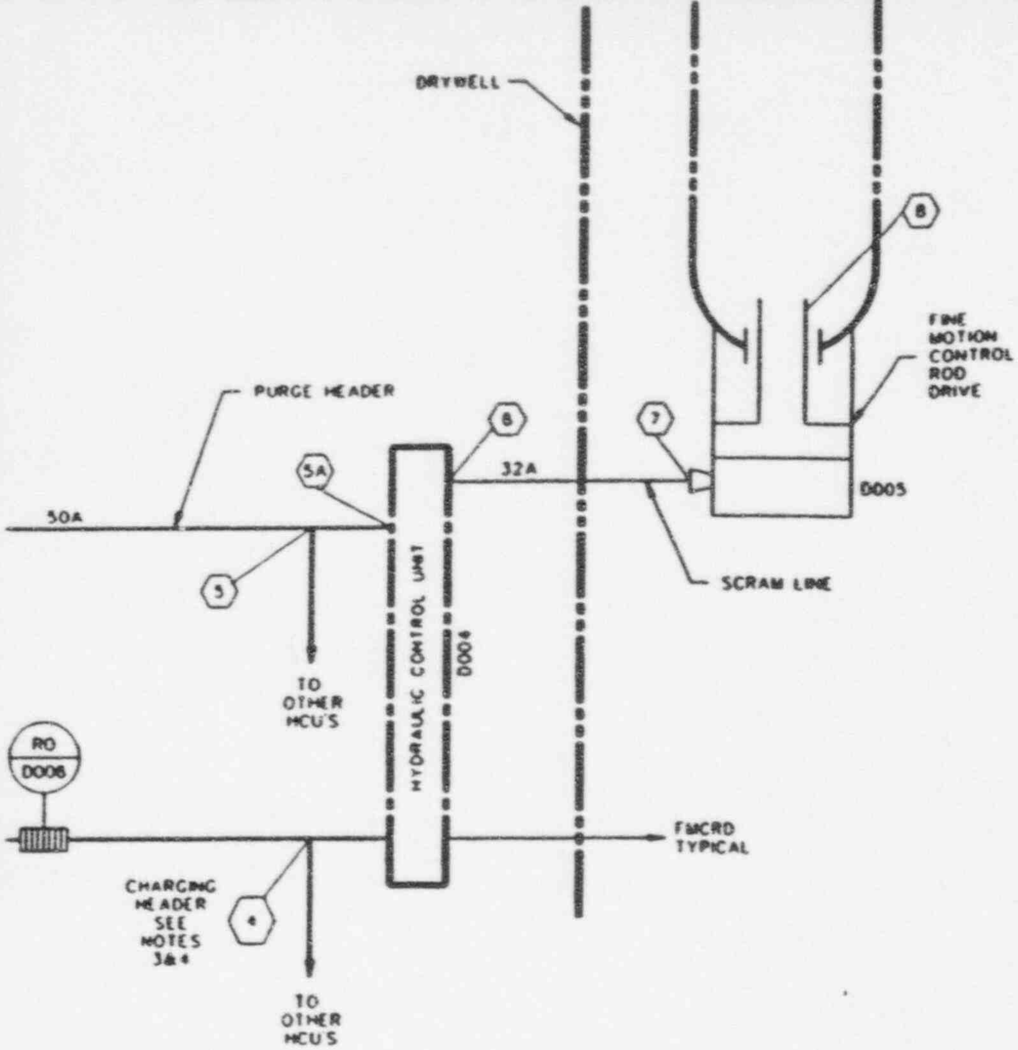
PROPOSED CHANGES

CHANGE PACKAGE NO. 8

Increase FMCRD Scram Piping Design Pressure



DRIVE WATER FILTER
MAXIMUM ALLOWABLE
ΔP = 0.196 MPa
AT 297 L/min

E 10

MODE B SCRAM - SIZES SCRAM LINE

NODE ⬡	1	2	3	4	5	6	7	8
FLOW, L/min	240	240				473	473	473
PRESSURE, MPa G						0.716 Min 1.15 Max LINE LOSSES (SEE NOTE 8)		PR

CONDITIONS
1. DRIVES SCRAMMING
2. FLOWS BASED ON ROD VELOCITY OF 344 cm/Sec
3. PRESSURE OF REACTOR AT 7.48 MPa G MEASURED AT VESSEL BOTTOM

MODE C SCRAM COMPLETED - SIZES THE PUMP SUCTION LINE

NODE ⬡	1	2	3	4	5	6	7	8
FLOW, L/min	767 Max	767 Max	527	527 Max	0	SEE NOTES 3&4		
PRESSURE, MPa G	TDH=11.77 Min					SEE NOTES 3&4		PR

CONDITIONS
1. SCRAMMING OF DRIVES COMPLETED
2. MAXIMUM CRD SUPPLY PUMP FLOW
3. PRESSURE OF REACTOR (PR) AT 0 MPa G

TABLE 1 DESIGN PRESSURE/TEMPERATURE

NODE ⬡	1	2	3	4	5	6	7	8
PRESSURE, MPa G	2.82	18.63	18.63	18.63	18.63	18.63	18.63	8.62
TEMP °C	66	66	66	66	66	66	66	302

Replace both with "23.5"

FIGURE 4.6-9 CONTROL ROD DRIVE SYSTEM PFD (Sheet 1 of 1)

PROPOSED CHANGES

CHANGE PACKAGE NO. 9

Use Higher Strength Material for Cladded Shells of RPV Pedestal and Tunnels

3.8.3.6.2 Reactor Pedestal

The materials conform to all applicable requirements of ANSI/AISC N690 and ACI 349 and comply with the following:

(excluding the portions submerged in the suppression pool)

Item	Specification
Inner and outer shells	ASTM A441 or A572
Internal stiffeners	ASTM A441 or A572
Concrete fill	f$_c'$ = 27.56 MPa
~~Stainless steel clad~~ Outer shell submerged in the suppression pool	ASTM A533 with SA-240 Type 304 L clad

3.8.3.6.3 Reactor Shield Wall

The materials conform to all applicable requirements of ANSI/ASIC N690 and ACI 349 and comply with the following:

Item	Specification
Inner and outer shells	ASTM A441 or A572
Internal stiffeners	ASTM A441or A572
Concrete fill	f$_c'$ = 27.56 MPa minimum

3.8.3.6.4 Drywell Equipment and Pipe Support Structure

The materials conform to all applicable requirements of ANSI/AISC N690 and comply with the following:

Item	Specification
Structural steel and connections	ASTM A36
High strength structural steel plates	ASTM A572 or A441
Bolts, studs, and nuts (dia. > 19 mm)	ASTM A325
Bolts, studs, and nuts (dia. ≤ 19 mm)	ASTM A307

3.8.3.6.5 Other Internal Structures

The materials conform to all applicable requirements of ANSI/AISC N690 and comply with the following:

Item	Specification
Miscellaneous platforms	Same as Subsection 3.8.3.6.4
Lower drywell equipment tunnel	ASTM ~~A516 Grade 70 or~~ A533 with SA-240 Type 304 L clad
Lower drywell personnel tunnel	ASTM ~~A516 Grade 70 or~~ A533 with SA-240 Type 304 L clad
Lower drywell floor fill material	A material other than limestone concrete

3.8.3.7 Testing and Inservice Inspection Requirements

A formal program of testing and inservice inspection is not planned for the internal structures except the diaphragm floor, reactor pedestal, and lower drywell access tunnels. The other internal structures are not directly related to the functioning of the containment system; therefore, no testing or inspection is performed.

Testing and inservice inspection of the diaphragm floor, reactor pedestal and lower drywell access tunnels are discussed in Subsection 3.8.1.7.

3.8.3.8 Welding Methods and Acceptance Criteria for Structural and Building Steel

Welding activities shall be accomplished in accordance with written procedures and shall meet the requirements of the American Institute of Steel Construction (AISC) Manual of Steel Construction. The visual acceptance criteria shall be as defined in American Welding Society (AWS) Structural Welding Code D1.1 and Nuclear Construction Issue Group (NCIG) Standard, "Visual Weld Acceptance Criteria for Structural Welding at Nuclear Plants", NCIG-01.

3.8.4 Other Seismic Category I Structures

Other Seismic Category I structures which constitute the ABWR Standard Plant are the Reactor Building, Control Building and Radwaste Building substructure. Figure 1.2-1 shows the spatial relationship of these buildings. The only other structure in close proximity to these structures is the Turbine Building. It is structurally separated from the other ABWR Standard Plant buildings.